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# Digital Divide in Education Sector of Bangladesh during COVID-19

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## ABSTRACT

Like many developing countries, Bangladesh has experienced noticeable digital divide in the education sector, which was apparently prominent during the COVID-19 pandemic period. All over the world, this pandemic urged the need for enhanced ICT infrastructures for students, teachers, and network providers in a single line to mitigate the sudden crisis on the one hand and provide access to education at all levels. This article focuses on the evolving situation in the education sector of Bangladesh as to how a digital divide has adversely affected equal access to online education. Based on 25 key informant interviews from the public and private university teachers as well as secondary data and information, this study attempts to demonstrate the tertiary-level education scenario of Bangladesh during COVID-19. The results found that the government intended to address the situation with its limited resources but could have done more to handle the education crisis during the unexpectedly-prolonged pandemic. It has been observed that access to ICT facilities is needed for an effective government initiative with an adequate budgetary allocation to ensure sustainability. Developing ICT infrastructure and taking necessary steps may reduce the existing and post-COVID-19 effects on digital divide.

**Keywords:** Digital Divide, COVID-19, ICT Infrastructure, Online Education, Government Initiatives, Bangladesh

## INTRODUCTION

Those who have access to information and communication technologies (ICTs) and the means to improve their skills can be differentiated from those who do not (NTIA, 1995; Iivari, Sharma & Ventä-Olkkonen, 2020). The "digital divide" (DD) or "digital inequality" is a growing problem in today's world that jeopardizes to derail attempts at social and economic progress. The digital divide has been defined as the disparity in access to and use of information and communication technologies (ICTs) between people, households, businesses, and regions of varying socioeconomic status (OECD, 2001). According to UNESCO (2001), the digital divide is a phenomenon resulting from the unequal application of, and access to, information and communication technologies, bound to lead to a global knowledge gap between information "haves" and "have-nots". It can be on a global, social, and democratic scale, with the former referring to the discrepancy between the developed and the developing world in terms of ICT access (Albalooshia, Ahsan & Rahman, 2021), the latter to the gap between individuals from various income levels, sexes, and ages, and the latter to the gap between people of different ages, genders, and sexual orientations (Norris, 2001). The digital divide is evidence that the information and communication technology revolution has brought both benefits and difficulties to countries with weaker information technology infrastructure. The World Economic Forum projected that 55 percent of the world's population lacked access to the internet in April of 2020 (Broom, 2020; Murgatroyd, 2020). Around 48% of

people worldwide do not have access to the internet in LDCs and other underdeveloped nations, only 19% of people have internet access (Broom, 2020).

Although it has had excellent socioeconomic progress and development over the past decades in the South Asian area, Bangladesh is still one of the developing countries experiencing enormous difficulties, including climate change, urbanization, inequality, inflation, poverty and good governance (Ahsan, 2020; Ahsan & Rahman, 2013). Education sector is one of the major sectors to overcoming such challenges. There are currently 151 universities in Bangladesh with 44, 344 students enrolled there (UGC, 2021). There are only five public universities in the country's capital city of Dhaka and the remaining colleges and universities are located throughout the different cities in the different divisions.

During the country's Golden Jubilee celebration in 2011, the government of Bangladesh announced plans to fully digitize the country by 2021 (Islam & Grönlund, 2011; MoSICT, 2009). The COVID-19 pandemic, however, revealed the drawbacks of digitalization, as it failed to improve the lives of rural and low-income people. Since March 17, 2020, all universities and colleges were closed for pandemic. Therefore, the government supported and even encouraged colleges to provide distance learning. Though private universities were ready to launch their online courses from the get-go, public universities were not, leaving students in dire straits who are already struggling to pay for necessities like a reliable smartphone, internet connection, and expensive cellular data packages. Still, despite many people's best efforts, significant progress or change has not resulted from people being encouraged to attend school. Instead, the lack of internet connection among low-income and rural pupils has sparked widespread discussion about the "digital gap" in education.

Thus, the primary goal of this research is to highlight how digital divide posed negative impact on education at the national level in Bangladesh and how dominance was being maintained at the tertiary level. For this reason, the study examined the extent of the digital divide in higher education after first examining the literature review perspective of the digital divide in relation to COVID-19, the current ICT infrastructure in Bangladesh, the status of online education during COVID-19, and the consequences of this pandemic on the education sector and the initiatives of the government. Since there already exists literature from the perspective of university students, this study has narrowed its attention to that of faculty, both in their public and private capacities. To wrap things up, this research aims to clarify how pervasive the digital divide is in the education sector of Bangladesh during the COVID-19 epidemic, what the actual setup of online education is, and what kind of measures are required to resolve the challenges.

## METHODOLOGY

The study has been designed to provide a clear indication of the digital divide and its impacts on the education sector during the pandemic. This study is qualitative in nature and a comprehensive literature review and secondary sources of data have been analyzed. 25 Key Informant Interviews (KII) have been conducted with university teachers including 17 from public universities and 8 from private universities. A list of interviewees is presented in Table 1. During the selection of the informants, special attention has been given to the diversification of universities located in various parts of Bangladesh. A questionnaire in a semi-structured interview protocol was prepared to conduct interviews. During each interview session with the informants, this study attempted to understand the opinions, experiences and challenges of ICT and digital divide issues.

**Table 1: Informant's profile**

| ID | Position | University location (district) | ID | Position | University location (district) |
|---|---|---|---|---|---|
| IPu-1 | Associate Professor | Rajshahi | IPr-1 | Assistant Professor | Dhaka |
| IPu-2 | Assistant Professor | Noakhali | IPr-2 | Lecturer | Dhaka |
| IPu-3 | Associate Professor | Dhaka | IPr-3 | Assistant Professor | Dhaka |
| IPu-4 | Professor | Joshore | IPr-4 | Lecturer | Dhaka |
| IPu-5 | Assistant Professor | Mymensingh | IPr-5 | Adjunct Faculty | Dhaka |
| IPu-6 | Professor | Khulna | IPr-6 | Assistant Professor | Khulna |
| IPu-7 | Assistant Professor | Sylhet | IPr-7 | Professor | Chittagong |
| IPu-8 | Assistant Professor | Sylhet | IPr-8 | Lecturer | Cox's Bazar |
| IPu-9 | Assistant Professor | Noakhali | | | |
| IPu-10 | Lecturer | Dinajpur | | | |
| IPu-11 | Assistant Professor | Dhaka | | | |
| IPu-12 | Associate Professor | Dhaka | | | |
| IPu-13 | Associate Professor | Barisal | | | |
| IPu-14 | Lecturer | Khulna | | | |
| IPu-15 | Assistant Professor | Rajshahi | | | |
| IPu-16 | Associate Professor | Tangail | | | |
| IPu-17 | Assistant Professor | Dhaka | | | |

Note: IPu-Informant Public University, IPr-Informant Private University

## FINDINGS AND ANALYSIS

The study's findings and analysis have two crucial components. Using a literature review lens, the first section focuses on the state of online education during COVID-19, the current state of ICT infrastructure, the consequences of COVID-19 on the education sector, and government attempts to address the digital divide. The researchers looked specifically at the extent of the digital divide among university students. Part two, then, will concentrate onto the perspectives and experiences of university faculty through key informant interviews.

### Perspectives from Literature Review

#### *Digital Divide vis-a-vis COVID-19: A Literature Review*

Some have questioned the foundations of the "digital gap" theory. It has been noted by several academics that discriminatory patterns based on factors such as race, gender, age, and socioeconomic status have been reduced in recent years. The skills gap is slowly replacing the digital divide as the defining factor in inequality. As the digital divide is much more than just access, it will not be solved by simply transplanting and distributing technology. As new technologies become more widely available and affordable, more people can use them. The majority of the population is clueless when it comes to maximizing the benefits of information and communication technologies (ICT). Experts are particularly worried about the spread of the pandemic leading to a "second level digital divide". The digital gap exists for a variety of reasons, including but not limited to socioeconomic factors including income, education, gender, demographic position, location, IT proficiency, and cultural factors (Carr,

2007). Income and education level are the most significant explanatory variables for access and utilization of information and communication technologies, according to multiple regression analyses conducted in a number of different nations (Hilbert, 2010). It was formerly believed that gender was a primary factor in the digital divide; however, structured statistical study of factors including employment, financial capacity, and education found that women with these advantages had greater access to information and communications technologies than males (Rubin, 2010). The new consensus, as described by Hilbert (2011), acknowledges that the primary issue is not how to link people to a certain network via a specific device, but rather how to extend the anticipated gains from new ICTs. Poverty, social inequality, lack of access to information and communication technologies, government corruption, and other forms of injustice are all thought to have their roots in a limited access to information (Galperin, 2010). Lessening access to the internet and other forms of technology is detrimental to the economy and society as a whole since the internet has become so integral to our everyday lives and because the new method of providing educational services is dependent on it (Nahiduzzaman & Ahsan, 2023).

The COVID-19 dilemma has led many to believe that digital technologies are the key to resolving issues with the delivery of educational services. However, families without access to broadband internet or gadgets fall further behind as a result of the COVID-19's emphasis on technology use, home instruction, and student teaching and learning. The parents will suffer to provide their children with the convenience of online class even if they are not educated and do not know how to open the program for a meeting, even if they have a gadget. Despite the pandemic, digital devices and ICTs remain the preeminent teaching-learning materials and instruments. As a result, people require training and instruction to learn how to best put modern tools to work for their health and well-being. One of the most pressing rights-based problems during COVID-19 is the provision of home-based education for students and teachers. According to Iivari, Sharma, and Ventä-Olkkonen (2020), the digital divide has exposed not just a technological influence but also responses to social and constitutional norms. Different people have different opinions on how seriously the societal problem should be addressed (Saeed et al., 2022). Human rights advocates, academics, and social workers have all argued that closing the digital divide is crucial to ensuring that people of all backgrounds, including but not limited to race, sexual orientation, socioeconomic status, and education level, enjoy the same rights. The researchers argue that the digital divide has deep ramifications for economic growth. However, there are academics who reject the existence of a digital divide and instead place greater emphasis on more conventional methods of progress like expanding the economy and the manufacturing and transportation sectors. They disregard the digital divide issue because they believe that, in a least developed country, the digital divide will persist regardless of what the government does, just as poverty, illiteracy, population explosion, unemployment, and lack of access to technology have persisted throughout history.

***Existing ICT Infrastructure in Bangladesh***

Despite the introduction of the first mainframe computer in 1964, Bangladesh's ICT infrastructure is inadequate (Islam & Salam, 2018). Internet access in Bangladesh did not become widely available until much later, as evidenced by the fact that UUCP email only began in 1993 and IP connectivity did not begin until 1996. For this reason, widespread computer use didn't emerge until quite recently. Since the SEA-ME-WE-4 underwater cable was connected on May 21, 2006, the internet has advanced significantly faster. To assure higher bandwidth service and to meet internet demand until 2030, the government has planned to connect to a third submarine cable. Initially, Dhaka was the only city in Bangladesh with access to reliable internet connectivity. Subsequently, the Bangladesh Telecommunications Company Limited (BTCL) took the initiative to roll it out to all of the

major metropolitan centers across the country. In 2011, only 3.7% of the population in Bangladesh had access to the internet; by 2019, that number has risen to 13%. (World Bank, 2020). By November of 2020, the total number of internet users in Bangladesh is expected to reach 110,561,357, as reported by the Bangladesh Telecommunication Regulatory Commission (BTRC). Among these people, 101.905 million use mobile internet and 8.656 million utilize broadband internet (ISP + PSTN) (BTRC, 2020). Alliance for Affordable Internet (A4AI) has released their Global Affordability Report 2020, and Bangladesh ranks 45th in the affordability index, with sub-index rankings of 39 and 45 for communications infrastructure and access, respectively (A4AI, 2020). It can be claimed that the private sector plays a monopoly role in the Bangladeshi internet and telecommunications market. The Grameen phone (made by a Norwegian manufacturer) is the most expensive option, but many people in rural regions still prefer to use it because of its convenience. Nonetheless, because of the high cost of internet service, rural residents have much less access to the web than those in urban regions. Teletalk (Teletalk Bangladesh Limited) costs an unexpectedly low rate, but paradoxically, the network is good in major cities, whereas Robi (Robi Axiata Limited), Banglalink (Banglalink Digital Communications Ltd.), and Airtel (Airtel Bangladesh) charge moderately.

***Outlook of Online Education during COVID-19***

The COVID-19 pandemic has shutdown schools, colleges, and universities starting from March 17, 2020. Since the academic year commences in January under the Bangladesh primary and secondary school system, only three and a half months of face-to-face education have been completed. Higher secondary students were unable to participate in the final exams at the end of June. In a budget speech in the national parliament, the Finance Minister AHM Mustafa Kamal stated that "COVID-19 has essentially caused the discontinuation of the regular academic curriculum for around 40.0 million students across the country" (Uddin, 2020).

The Bangladesh government has ordered the school and university authorities and other educational institutes to conduct virtual classes through feasible digital platforms during lockdown (Rahman, 2020). Zoom applications, Facebook Live, Google Classroom are being used by the teachers to take classes. Side by side, the government has broadcasted primary and secondary school-level subject-wise classes for students on BTV (Bangladesh Television) World, and a website building process is on the way to being implemented, which will offer home-accessible education materials for free. Online classes has helped students who have access to technology, but the flow of education has not the same for those who have and those who don't. The main issue is how much a system holds them accountable for disadvantaged groups.

The first problem is to continue education during this pandemic. Facing a lack of infrastructure, educational institutions started taking online classes without having any specific guidelines. Specific guidelines refer to government incentives to buy online education platforms such as Microsoft Team, Zoom, and Google Classroom. Some students and even some teachers lack basic skills to keep up with Skype and Zoom. Moreover, there has no unified assessment system or website for exam assessment. The overall situation became confusing as there were no proper instructions from the respective authorities. In the beginning, many teachers had good ICT literacy and coped with the system better than the traditional one, and many parents tried to support their children at home. However, each educational institution has followed mixed policies for things to be done, with no proper guidelines or quality assessment initiatives on behalf of the concerned authority. As a result, frustration among the teacher's students and among the parents has increased day by day. In some universities, students have protested against online education as they have no logistical support to attend classes via digital devices. Students were frustrated, deprived, and helpless

due to a lack of ICT knowledge, a lack of digital logistic support, and a poor connection to rural areas. The above situation led the University Grant Commission (UGC) of Bangladesh to postpone all kinds of online exams. The final exams will be held after the COVID-19 situation improves. With limited time and a lack of tools, the online education was not interactive enough; the classes are not as interactive as those in physical classrooms. For a few hours each day, the teachers are online. In this short period of time, all the subjects are being taught. Television classes have no way to make students understand. This was more severe for science students who should have worked in a lab (Awal, 2020).

In rural areas, people know the general use of the phone; many do not have a computer, no internet connection, or do not know how to use the internet properly. It has been reported that 90% of students in hilly areas and remote areas have been directly deprived of internet-based teaching and learning in Bangladesh (UNICEF, 2019). One problem is the weak and unstable connection and immobility of the Internet. Another problem is that many poor students stay away from computers and do not have smartphones. Many students do not have the financial means to buy data online.

Save the Children Bangladesh's Bangladesh branch investigated the feasibility of distance learning for continuing non-formal primary education through distance learning. They found that 69% of students have no smart phone in their family, and even 10% of families do not own any kind of phone to take education instruction; only 23% of families have a television to watch education programs provided by the government (Save the Children, 2020). After the closing of educational institutions, students are literally confined to their homes. Extending the pandemic period, the government expanded several times the closing period and started distance education via television. BRAC, the world's biggest NGO, conducted a study on 1,938 students (51% female and 49% male; primary school students 50% and secondary school students 50%) from 16 districts across the country. They found 56% of students did not participate in TV classes. This ratio is higher in ethnic minorities (75%), madrasa students (68%), and students with disabilities (61%; BRAC, 2020). They mentioned that students did not participate in the class mostly because of logistical constraints like television, internet, electricity, cable-network connection, etc.

A study conducted by Habib, Rashid, and Malek (2020) to verify the mental, technical, and financial readiness of government university students to participate in online academic activities. A total of 607 (57% male and 42% female) students have participated in the study (Habib, Rashid, & Malek, 2020). Among the participants, 94% of students responded positively about the accessibility of participating in online learning activities, but 47% of them claimed that buying data from telecom companies is unaffordable for taking part in online classes. 65% of students are completely mobile data dependent; 36% have wifi access and 2% use portable modems; and 85% of rural students believe that the main challenge is the high cost of purchasing mobile data (Habib, Rashid, & Malek, 2020). The study also focuses on the fact that 7% of the participating students rely on smartphones, where only 6% of students have laptops, 3% of students have tablets, and only 1% of students have their own desktop, and about 20% of students in the experimental class using Zoom and Google Meet software were absent due to various problems in class activities (Habib, Rashid, & Malek, 2020).

***Effect of COVID-19 on Education Sector in Bangladesh***

Unlike other countries, a severe impact of the COVID-19 pandemic on the education sector of Bangladesh can emerge from the economic downturn and from inadequate pandemic control measures. According to the Household Income Expenditure Survey (HIES), about 23.90% (or 8.4 million) of the students' families were living below the poverty line before the pandemic. With about three months of long lockdown since March 25, 2020, and a drop in annual per capita income of 25.0%, 43.90% of the students' families could fall below

the poverty line, of which 51.70% are from primary, 42.40% are from secondary, 30.20% are from SSC/HSC, and 19% are from university level (SANEM, 2020).Hence, there could be as many as 7.70 million additional students' families falling below the poverty line during this crisis, bringing the total number of students below the poverty line to 16 million. The most pressing question is whether 16.0 million students from low-income families will return to school again. In addition, school is not only a place of education but also social protection and good health, as well as psychosocial support for children, teenagers, and young adults. Therefore, closures of schools have a far-reaching adverse effect on social and economic dilemmas such as school dropouts and the digital divide.

According to BANBEIS, in the normal situation before the pandemic, the dropout rate in Bangladesh was around 37.60% for secondary and 19.60% for post-secondary education, which is high for a developing country like Bangladesh (BANBEIS, 2019). It can be outlined here that the impact would be higher for girls' students, too. This situation is also pathetic for the disabled students' accounts of around 39,000. According to estimates from the Household Income and Expenditure Survey (HIES), nearly 24.50% of disabled students come from low-income families (BBS, 2019). Because of the pandemic, 45% of families of special students might fall below the poverty line. However, irrespective of their family background and income status, due to school closures, these children might face greater challenges than other students. Such abrupt poverty and severe economic crises have long-term consequences for development and the right to an education. Students' families are struggling to meet their basic needs. At that time, the thought of buying a communication device is nearly impossible and unimaginable for these people who have fallen suddenly below the poverty line. As a back-to-back effect of the economic crisis, there is a big chance that Bangladesh might see a return of higher rates of child labor, child marriage, or even transactional sex for children, along with higher dropout rates.

The Bangladesh Multiple Indicator Cluster Survey (MICS) carried out in 2019 by the Bangladesh Bureau of Statistics (BBS) in collaboration with UNICEF Bangladesh stated that there are still 5.0% of households that do not own a mobile phone. Going for online education is not a feasible choice for Bangladesh yet (BBS, 2019). In the case of computers or tablets, only 5.60% of households have one. However, having a computer or tablet is not sufficient, with only 37.60% of the households having internet access at home, covering 53.10% of urban areas and 33.20% of rural areas (BBS, 2019). As a result, there is a clear gap between rural and poorer regions suffering from less access to ICT than urban and richer areas. According to the HIES conducted in 2020 estimation, approximately 12.70% of poor households do not own a single mobile phone. Therefore, going online for all will widen the existing gap in digital inequality. Overall, due to the fall in income, overall expenditure on education will inevitably reduce, especially for lower-income families. Many students might leave low-cost private schools for overcrowded public schools. Middle- and lower-middle-class families prefer to send their children to low-cost private schools; these schools operate on a shoestring budget and are already facing an existential crisis due to their failure to provide online education. Guardians are not willing to pay the school fees; rather, they may not send their children to the schools till the end of the year (Awal, 2020). Moreover, teachers in zero-pay situations may leave their jobs.

***Government Initiatives on Digital Divide and Education***

Digital Bangladesh was the electoral pledge of the ninth parliamentary election of the current Bangladesh Awami League (BAL) government in 2009. Among the visions of the "Charter for Change" is to arrive at a "Digital Bangladesh" by 2021. The Bangladesh government prepared the National ICT Policy (2009 and amendments in 2010) (Islam & Gönlund, 2011). This policy is an important instrument for digital Bangladesh as it has focused on digital divide elimination, which is essential to being a middle-income country as

well as achieving sustainable development goals (Islam & Grönlund, 2011). There is no doubt that education determines the path of change and establishes a nation's development milestone. This policy has focused on "extending the use of ICT instrumentally in the educational process at every level" (MoE, 2010). Despite some curricula and library resources, there are no guidelines for future online education. Despite this, the government has taken many initiatives in the last few years at the primary level of education for poor families so that they can send their children to school instead of labor work. The initiatives, such as free food for school-coming children and a monthly cash scholarship for the student, attracted parents to send their children to school and college.

However, during this critical pandemic crisis, the allocation of education expenditure with a low spending trend shows that Bangladesh might face more prolonged consequences in the education sector as an aftermath of the pandemic due to digital inequality. So, positively and critically, thought is to be materialized in education budget allocation, especially with regard to pandemic and post-pandemic leftovers to overcome immediately. Bangladesh consequently allocates a low budget to education in South Asian developing countries and Asian countries as a percentage of its national budget and GDP. There is no good plan or project to rescue and recover from this destructive pandemic and no plan on how to cope with the new normal (Ahmed, 2020). Since independence, the budget for the education sector has been neglected and conducted with mismanagement. A review of expenditure for education at different periods reveals that the allocation in this field has always been inadequate. The total budget for the education sector in fiscal year 2019–20 was 61118 crore in domestic currency, which is 17% of the total budget (MoF, 2019). It was 2.3% of total GDP for the entire education system that covers all education sectors, including pre-primary, primary, secondary, and higher education. An assessment of the expenditure of the past two years reveals that 10–12% of the overall budget has been allocated to education, where UNESCO (2015) proposes allocating at least 20% of the total budget to education. In order to achieve the goal of quality education, it is necessary to allocate 4% of the total GDP to education. However, the budget allocation decreased from 12.2% to 11.70% in fiscal year 2021, and the GDP share decreased by 2.09% from the revised budget of 2.18% in fiscal year 2020 (Ahmed, 2020). The Campaign for Popular Education (CAMPE), a reputable NGO in Bangladesh, and international organizations urge the government to allocate at least 15% of the total national budget to overcome the pandemic effect and to initiate a three-year recovery plan.

Despite government initiatives and challenges, the telecommunication companies of Bangladesh have also moved in a different direction. A hike in Internet expenses during the pandemic expands the digital divide. The telecommunication companies did not reduce their data or call rates during the pandemic. The government increased taxes on telecommunications service providers in the pandemic budget for 2020. It was proposed in the budget of 2020–21 to increase the supplementary duty on services provided through SIM-RIM on mobile phones up to 15 percent. As a result, mobile customers had to spend more money on extra charges for talking and data. Increasing the supplementary duty put pressure on the customer. The government is constantly imposing a tax burden on the telecommunication sector. Therefore many people will lose access to the internet due to the high purchase rate. Customers of telecommunications company Banglalinkhaveborned10% of the burden of additional taxes. In such a situation, low-income people suffer more if the additional 5 percent supplementary duty has increased. A robust ICT infrastructure in the country requires time and money; additionally, no policy guidelines issued by the government and concerned authorities are tangible as of yet, despite the fact that the Finance Minister stated during the 2020-21 budget discussion that all government primary schools

will be provided with internet access, as well as two laptop computers and multimedia projectors (Ahmed, 2020).

**Perspectives from University Teachers**

***Adequacy of ICT infrastructure***

Among the informants' information, the ICT infrastructure in some universities is under development, some universities have developed partially, and some universities have developed at moderate levels. All informants agreed that the coverage of broadband Internet is very limited and has a slow speed. They added that 4G coverage is still in the development stage in Bangladesh, and thus, mobile internet infrastructure is not up to the mark. Even in some public universities, teachers are not well-adopted with modern ICT infrastructure; they are dominated by traditional practices. IPu-1 stated that "our infrastructure is adequate but the students' ability and their conditions to continue education during COVID-19 are challenging." The physical infrastructure of public universities is still not good, and therefore, the setup of ICT equipment poses significant challenges. The respondent from the private university stated that the situation is better in their universities where existing physical infrastructure and ICT infrastructure are in good condition. IPr-4 responded that the existing ICT infrastructure is good for their university. Informants also believed that it was past time to take the necessary steps to equip ICT infrastructure in order to ensure continuous digital education at scale. IPU-1 informed that "We (our country) have an ICT policy, however, the implementation of the policy is very slow."IPr-5 thinks that "we have lots of scope and capacity, but we have no proper plan to adopt the modern era by posing ICT demands."

***Satisfaction of Internet Service Providers Delivered Their Support in ICT***

Out of 17 informants from public universities, only five are satisfied with the internet service providers, and the remaining informants are not satisfied due to high cost, poor internet connectivity, low speed, etc. IPu-2 stated like this: "I could attend a Zoom meeting with colleagues using GP Internet service in my village. But, at the same time, I have seen that many of my students have dropped the class due to the poor Internet connectivity. I was not sure which mobile network they used, though". IPu-4 stated that "I am not happy for two reasons. I use the SIM of the Robi operator, and in many places, their network capacity is very poor, and I got a very low signal. On the other hand, they have no 4G coverage in all areas, and therefore, except at home, I cannot use the internet properly elsewhere.

All the informants agreed that there are still bandwidth charges are pretty high and the network remains very poor in the rural areas of Bangladesh. IPu-1 addressed the fact that "despite the pandemic impact, all service providers conducted their operations with a pure profit orientation; even during the pandemic, there were no significant concessions in lowering the price of internet packages, and the government should largely be irresponsible in this respect". In this context, IPr-6 said that "Bangladesh still has trouble with slow internet connections and expensive devices".

***Status of Universities Located in Remote Areas of Bangladesh***

Ten public university informants (N = 17) opined that public universities situated in rural areas have far more trouble conducting online education because these universities have been founded recently; therefore, adequate ICT technology is limited. Two informants (IPu-1 and 17) claimed that "public universities located in the remote areas of Bangladesh are basically newer universities with inadequate infrastructure and academic facilities, and lower numbers of students and faculty staff". The number of students to connect with online is manageable, making education more effective than at large public universities, but frequent internet, digital devices, and high prices impede education".

All the interviewees emphasized that the big challenges are slow internet speeds, no broadband access, and infrequent power supplies in remote areas. On the other hand, there

are more challenges at these universities because of new management, planning, and preparation. Most of these universities have little experience with management and planning to deal with difficulties and emergencies. Two of the informants (IPu-3 and 8) stated the same thing: "Though I have no practical experience about it, however, what I assume is that public universities located in remote areas are not able to conduct their education fruitfully due to a lack of planning, preparation, teachers' professional learning, and facilities for online education". But IPu-4 opposed the above opinion and said that "as most of the universities are united under the umbrella of BdREN for internet connectivity". Thus, more or less fruitful online education can be provided.

The pedagogy of online teaching-learning activities differs from that of face-to-face teaching, and universities, including new universities in remote areas, were completely unprepared to face the challenges of the pandemic; thus, immediate initiatives of conducting teaching-learning by untrained teachers were extremely difficult; however, the UGC ordered to begin online education through their provided Zoom account. So it was very difficult to conduct teaching-learning activities fruitfully. IPu-2, IPu-7, and IPu-14 asserted that "conducting online education is not a big problem for any university, but the inadequate infrastructure of universities, especially in remote areas, the lack of teachers' skills and training for online classes, students' inability to buy digital devices and data, and infrequent power supplies and internet service in the remote area are the main constraints to conducting online activities fruitfully".

Reluctance was also found among students to participate in online classes because of abrupt internet disturbances, good digital devices, and a lack of online class activities training for teachers. Significantly, a portion of the university teachers are sincerely trying to provide fruitful education, and the university administration is still struggling, but the challenges related to online education have appeared as constraints. By supporting the government initiatives with the existing economic condition and reality of the pandemic, IPu-9 stated that "Till now we are far from optimum satisfaction, but I am optimistic, though we are occupied with insufficient equipment and limitations of students' access to online classes".

Because the COVID-19 swept across the country in such a short period of time, the preparedness was inadequate. The situation at all universities is similar because almost all students live in remote areas, and infrastructure, teacher training, students' unfamiliarity with online classes, and scarcity have all been identified as barriers to providing quality education.

***Online Education Performance during COVID-19***

Most of the informants think online education performance during the COVID-19 pandemic was poor, and some of them think it was very poor. Among the 25 respondents, only one stated that online education performance was good during COVID-19 in public universities in Bangladesh. IPu-1 stated, "I think the performance of online education in public universities is not good. The students' attendance is not as expected, and teachers are not fluent in using technology and are less experienced regarding pedagogical issues in online education. The entire performance of the students, teachers, and departments is not satisfactory as they have no prior experience with and training in online education". Informants think that where internet connectivity was good and adequate infrastructure was ensured, the quality of online education was relatively good. IPu-3 stated that "The Zoom platform and Learning Management System (LMS) worked well for the students who had sound internet connectivity". Interviewees stated that there are few indicators behind the reason for the poor quality of online education, such as a bad internet connection, poor financial conditions of the students, carelessness of several stakeholders, lengthy administrative decision-making for online education, poor technological infrastructure, etc. IPu-17 said, "I can say that it is continuing but maintaining quality is really challenging.

Since online education was not substantially evident and practiced in the past, existing online education performance in public universities in Bangladesh is far away from the real characteristics of online education". Lack of planning, preparation, teachers' professional learning, and facilities for online education are the main obstacles to maintaining quality".

Out of eight informants from private universities, five agreed upon the dissatisfactory quality of online education during the COVID-19 pandemic. According to IPr-1 and IPr-7, "in my opinion, the performance of online education appears to be very dissatisfactory in private universities, as there are ethical issues concerning the assessment and testing, students' responses, health hazards, and so on". However, due to the nature of online education, private universities are unable to participate in the "session jot". However, well-reputed private universities with good technological infrastructure are handling the crisis comparatively better than public universities and private universities with fewer resources. IPr-2 stated that "well-reputed universities have a comparatively better performance as they have provided teachers and students with necessary devices".

***Dominance of Digital Divide in Education Sector***

Among the 25 informants, only four interviewees see the digital divide as less dominant, and the remaining stated that the digital divide was highly dominant in the education sector of Bangladesh during the COVID-19 due to poor educational infrastructure and internet connections. Most of the informants identified some major issues responsible for the digital divide, such as interruptive electricity supply, lack of instruments and electronic devices, poor network connection, and other unavoidable socio-economic situations. "During the pandemic, we have seen overtly about the situation of the digital divide, especially among public university students, the majority of whom hail from rural Bangladesh and have economically challenged conditions" according to IPu-9. In Bangladesh, there is an explicit digital divide in terms of digital infrastructure—the absence of a reliable mobile network and power; poor and expensive broadband services in rural areas; and differences in the extent of digital literacy—there is an obvious gap between rural and urban people. Three informants noted that the digital divide was a matter of concern at the beginning of the pandemic. However, with great effort from different stakeholders, it has been reduced gradually and the situation is under control now. IPu-3 stated that "At the beginning of the pandemic, it was significantly dominant, but the continuous efforts of the ICT sectors improved the situation a lot in the midst of the pandemic, though some problems still exist".IPu-4 and IPu-6 addressed the same issue as "In the very first few months of COVID-19, it seemed the digital divide was very high, but in my view this disparity is reducing gradually". Informants agreed that the dominance of the digital divide as a matter of concern is not similarly evident in public and private universities in Bangladesh during this COVID-19 pandemic. Private university interviewees responded that they have students from the middle and upper middle classes, and most of them live in urban and semi-urban areas where good internet connection is available. At the same time, private universities' administrations showed a quick response to building the technological infrastructure to continue education through online courses, and the University Grants Commission (UGC) gave them permission to do so. As IPu-13 stated, "This is more dominant in public universities compared to private universities due to the financial status of students, lack of access to smart phones, inability to afford internet packages, and above all, power supply disruption". All informants from private universities informed me that their students faced a relatively smaller digital divide as they belonged to middle- and upper-middle-class families. IPr-1 said "the divide is very dominant at every level and with all the stakeholders".

***Initiatives Taken by the University***

Both public and private universities have taken a number of initiatives in digital education during COVID-19. After the declaration of general holidays, every university

teacher is requested to take online classes. All interviewees from private universities stated that they started online classes early to keep their students, attract new students, and continue education without disruption; however, the authority provided very little support with no extra initiative or facilities. On the other hand, public universities have started online classes lately. They have taken a number of initiatives, such as encouraging teachers and students to begin online classes; in this regard, they first provided a small amount of soft loan for students to purchase digital devices by the end of 2020, and then began to provide, supply devices, and financial support to the departments. Some universities provided students with loans of 25,000 BDT with no interest to purchase digital devices. Even university teachers could be given a personal loan of Tk 50,000 to purchase laptops or computers. Our university provided some allowance for buying equipment (i.e., digital sketchpad) to support easy and effective online classes, financially supported some needy students and provided free internet packages to the needy students, too. In addition, a personal loan (Tk 50000) is issued for every teacher so that they can buy laptops or computers. The relatively same situation was stated by another public university informant, and IPu-3 stated that our university has arranged financial support for the poor students. Moreover, the university has arranged institutional emails for all students so that they can get low-cost data facilities from the government-run Teletalk mobile company. IPu-4 and IPu-11 stated that they used a LMS and the classroom lectures were conducted through a zoom platform, and sessional works were conducted by emphasizing secondary databases rather than visiting the field. It has been found that some universities provide a premium Zoom account to every teacher for arranging online classes and meetings. IPu-4 also said that teachers have been trained to teach online classes by the Internal Quality Assurance Cell (IQAC).

***Measures to Overcome the Challenges***

Informants have recommended initiatives and measures to be taken to overcome the challenges. All informants claimed the country had a poor internet connection and that a substantial number of students had no digital devices, so first they emphasized the need to ensure compatible digital devices for all to take part in online academic activities and to provide frequent high-speed internet service throughout the country. IPu-1, IPu-2, IPu-3, IPu-5, IPu-6, IPu-7, IPu-11, IPu-13, and IPu-15 all had different ideas, but they all agreed that the university authority and the government should work together on a project to give digital devices and high-speed internet packages to both students and teachers for free or at very low prices. This may be the best way to solve the problems caused by the digital divide in the country during the pandemic.

Private university students despite not experiencing acute hardship on digital devices, private university informants assumed that a large number of students could be affected by the pandemic, and they advised university authorities to contact students personally and inquire about their circumstances. IPr-2 and IPr-3 opined that “authorities can provide students with scholarships according to their needs and merit list so that they can buy digital devices or a smart phone and the Internet to continue their online studies”.

Education is a national concern, and the pandemic is a global emergency, so every national government and non-governmental institution and organization should work together to rescue humanity from the abyss. Because this is a national crisis, “the government, universities, and telecommunication companies should collaborate to support each other in order to rescue from loss by supporting student-related services, ensuring education, and providing all assistance”, according to IPu-2.

It is an egregious charge leveled against Bangladeshi telecommunications companies that they provide poor Internet service and charge significantly more than other countries. So they need to consider, in this emergency period, developing a mood and standard of internet services with a minimum cost. And, from the ground up, the government should form a

committee to investigate all weaknesses, challenges, and prospects for all universities' capacity and needs. IPu-3 and IPu-10 think that government should support the students who are experiencing economic crises. They should also talk with phone companies to make sure they have a good network and that mobile data is cheap through different mobile operators.

The COVID-19 pandemic reality was not expected by anyone, and where it would end the destructive impacts, the whole world is paying a severe price. Consequently, the scenario of the digital divide has suddenly emerged in developing countries all over the world. On the other hand, this has opened up a new window of opportunities to address and scrutinize the weaknesses of ICT infrastructure and to overcome such a situation. IPu-10 also said, "Investment in education and ICT is pretty much a reality, so the government needs to make sure budgets are set up to meet needs and make a national plan with short-term and long-term goals so that losses can be made up and all educational institutions can be digitalized, putting an emphasis on all the necessary and modern equipment".

Bangladesh is a rural and remote area by nature, and the majority of university students live at home in a village, but internet and digital facilities have been dominated by urban areas, resulting in a digital divide that is acutely recognized for villagers. On the other hand, these students' continued living at home has been a burden on their families, since they earn money through part-time jobs or tuition. On the other hand, family income has dropped to a low point, and in some cases has even reached zero. Subsequently, it is focused on the severe phenomenon of economic hardship among a large number of students. So alternative steps have been suggested from responded should be taken by government to over the situation. IPu-8 and IPu-12 urged that "government and related financial organizations start loans for students without any interest who are living with severe hardship due to economic crises so that they can survive and continue their education smoothly".

Abruptly breaking out, COVID-19 has dismissed all frameworks and habits and indicated a new direction for post-pandemic health. So, teachers and students of the forthcoming era will be obliged to adjust their practical knowledge and skills in ICT to integrate them into everyday life. Seven informants from public and private universities (IPu-2, IPu-3, IPu-4, IPu-6, IPu-10, IPr-4, and IPr-6) think that proper training of online education for all teachers is needed for effective education. IPu-6 think that training for online education pedagogy, creating contents, and using contents effectively for students is very essential, particularly attracting students' concentration to online education.

Most informants have emphasized the need to create an LMS for each university separately. Following the outbreak, the government provided licensed Zoom IDs to all public university teachers in order to begin online education; however, almost every university lacks its own LMS, making class attendance, recording, data collection, assignment submission, and contacting students impossible, especially at universities that cannot take online examinations. LMS for each university can reduce difficulties. For example, IPu-2 suggested that each university should have its own LMS system and a specialist IT team who will support in every circumstance during online classes and exams, even providing training and assistance to teachers and students all the time. However, IPr-1 stated that "Sometimes, students face difficulties during classes due to poor network services. The Bangladesh government could provide some dedicated frequencies for the private universities to ensure buffer-less online classes". IPr-3 also urged that private university authority should have provided the required allowances for high-congrats laptop and dedicated internet connection teachers and students as well.

It is a common feature for all societies that new additions or new starts sometimes make it difficult to adjust to social trends, so awareness should be raised at all levels of society. It is needed to break out the inertia of mental change to get used to using IT tools, so students, teachers, guardians, and administrative officials are required to adjust to the new normal in

an emergency period to overcome obstacles. According to IPu-7, "the people of Bangladesh can quickly adopt any new technology, so they must develop a mentality to adjust to the new normal, as well as an urgent need for a favorable policy shift by the government with adequate investment to address the aforementioned challenges in fact". One of the informants (IPu-14) asserted a comprehensive suggestion for reducing the difficulties. He stated that four specific measures can be taken. Firstly, the university authority should make an agreement with the bank and IT companies so that both the students and teachers can buy computer-related equipment at a lower price with low interest. Secondly, the university also should discuss with the cell phone operators and broadband internet companies how to extend their range and reduce the price of the internet package. In return, the university could provide technical and consultancy support to the companies. Thirdly, after one month of rigorous training for both the students and teachers, online education should be started in full swing, including the assessment procedure. Finally, free access to libraries, including journal repositories, should be available to the students so that they could access the resources from their homes.

## RECOMMENDATIONS AND CONCLUSION

Bangladesh is suffering from the crisis of technological advancement among its people. Existing digital divides in the education sector became a big issue during this pandemic. The immediate impact of COVID-19 showed some overwhelming situations in the education sector and limited the learning opportunities for all types of learners. Literature, data, and interviews show that a sudden pandemic outbreak across the country makes it hard to deal with things as they are now. Though some initiatives and measures for continuing online education were implemented after a few months, they were insignificant in comparison to the demand. Still, in villages or remote rural areas, the availability of digital devices is considerably lower. The COVID-19 pandemic urged an emergency need for ICT infrastructure among school and university students, teachers, and network providers in a single line, saying that everyone is in need of developed infrastructure to access education. The Bangladesh Government must take the necessary steps to minimize the digital deprivation faced by rural and low-income people in the country. The respective authorities and universities are taking a number of initiatives, like giving soft loans to students and teachers to buy digital devices on a long-term basis. The government should focus on rural and remote areas, as serious digital deprivation exists there. The government should take the initiative of providing free Wi-Fi connections to teachers and students, including broadband in all educational institutions of the country, with the joint initiative of the Telecommunication Regulatory Authority (BTRC), the Mobile Phone Company, the A2I Project, and the Education Authority through the smart national identity card. This will reduce the gap between the two systems. In this respect, the telecommunications sector should also get incentives to give free data access to particular education websites and to develop their network infrastructure at a rural level.

Students have suffered from mental anguish, fear, and depression, including their parents and teachers. It has not possible to give free computers with stable and cheap internet to students by the government in Bangladesh, but it is firmly possible to reduce losses in education and decrease the digital divide. Still, putting enough money into the education and information and communications technology (ICT) sectors could help develop ICT infrastructure in schools. Therefore, Bangladesh needs to develop a cumulative plan, making policy and comprehensive initiatives with all concerned institutions, organizations, and authorities. With a long-term view, making a long term strategic plan to fix the digital divide could also bring the education sector back to modern and normal life.

Finally, it can be stated that this study focused on the digital divide in tertiary-level education in Bangladesh through 25 KII and relevant literature review perspectives. Even though this research has tried to give a real picture of the digital divide and a policy direction based on existing literature reviews and interviews with university teachers, it is also thought that more empirical data would give a more real picture. This would require enough money and time. In this way, a comprehensive study with teachers and students at all levels, service providers, and relevant government and non-government authorities through a large sample size questionnaire survey, KII, and secondary survey could help policymakers come up with strong guidelines and a strategic or rescue plan for the future or post-COVID-19 period.

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