Article

Education System in Bangladesh Amid COVID-19: Traditional Scenario, Emergency Protocols, Challenges and a Proposed Sustainable Conceptual Framework

A. S. M. Shamsul Arefin [1], Sabbir Ahmed Chowdhury [2,*], Ruth Christina Roy [2], Md. Mizanur Rahaman [3] and Beth Cross [4]

1 Department of Biomedical Physics & Technology, University of Dhaka, Dhaka 1000, Bangladesh
2 Institute of Education and Research (IER), University of Dhaka, Dhaka 1000, Bangladesh
3 Department of Microbiology, University of Dhaka, Dhaka 1000, Bangladesh
4 School of Education & Social Sciences, University of the West of Scotland, Glasgow G72 0LH, UK
* Correspondence: sabbir.ahmed@du.ac.bd

Abstract: This study demonstrates how significantly the COVID-19 pandemic has affected Bangladesh's formal education system. Despite the fact that Bangladesh introduced Information and Communication Technology (ICT) in educational practices before the pandemic, effective ICT deployment could not be integrated at all levels. Even though online classes and other print- and electronic media-based approaches evolved into the "new normal" in an effort to address the difficulties brought on by the pandemic, both teachers and students have faced and continue to encounter many challenges. A convergent parallel mixed method design was followed for this study. Data were collected from 205 Bangladeshi students and 50 Bangladeshi teachers through semi-structured questionnaires. In addition, 11 parent interviews and 12 Key Informant Interviews were conducted. According to the findings, the lack of proper training for teachers, poor socio-economic conditions, lack of internet availability and speed, the shortage of ICT equipment, students not being technologically exposed, and the disruption of electricity are major issues hindering the fruitful implementation of online education. Creating an ICT framework, providing subsidised internet for students and instructors for instructive purposes, promoting alternative means to carry on formal education, dedicating instruction hours in TV and radio channels, ensuring proper IT infrastructure and tools, and taking initiatives to promote the learning management system can play a significant role in creating the ideal environment to promote online education. In summary, this study suggests a holistic framework to continue formal teaching-learning in different levels of education to achieve sustainable development goals (SDG) without any disruption in emergency contexts such as the COVID-19 pandemic.

Keywords: COVID-19; ICT; SDG; teaching-learning; LMS; social media; online class; formal education

1. Introduction

In the year 2020, the ravaging pandemic due to the spread of the COVID-19 virus caused disruption in educational practices to a great extent. The impact of the pandemic on Bangladesh's education systems and practices is only now emerging. As social distancing is being promoted to ensure public safety during this unprecedented time, the usual means of teaching-learning are no longer suitable to continue the education process [1]. It is evident that the COVID-19 pandemic is about to change the education landscape [2,3]. There has been pressure to transition many courses across all educational levels from traditional classroom instruction to online learning [4]. However, many undeveloped nations have been facing huge challenges in adopting such a paradigm shift [5]. The majority of teaching faculties are unfamiliar with the technology resources that must be engaged to conduct online lectures, and lack past experience as well as the training related to in online teaching [6,7]. Similarly, a majority of the students have limited past

online experiences [8]. The necessary information technology, such as virtual classroom software that would make it easier to conduct online training, may also be lacking in many educational institutions [9]. Therefore, it is timely to explore the opportunities to overcome barriers to continue education on virtual platforms, as online education can transform the formal education system by maximizing educational opportunities [10].

The COVID-19 pandemic has already been labelled as a huge challenge to our education systems. To overcome this challenge, we need to address the reassuring of students and parents as one of the vital elements of the institutional response. Many governments like the Government of Bangladesh (GoB) have taken the path to cease the traditional face-to-face mode of education in response to the pandemic. It required that educational institutions switch to a virtual educational platform. Several kinds of changes to traditional curriculum delivery are required to propagate this transition [11]. For instance, providing students with sufficient study materials, recognizing a reliable assessment process, and preparing teachers and other related staff with appropriate training were all required for the smooth transitioning to remote teaching. The approaches to synchronous and/or asynchronous virtual learning will certainly be different for every level, from the elementary level to tertiary level. According to educators and specialists, educational institutions need to take advantage of asynchronized learning in order to enable the students to go through effective learning in digital formats [12], as asynchronous learning focuses upon learning outcomes overlooking the social dimension [13].

In the context of Bangladesh, formal students are expected to learn in classrooms; and sometimes outside of the classrooms in social settings [14]. This model of education is now threatened by the pandemic, and about 38 million students are facing abrupt changes in their education experiences [15]. Even if this event is labelled as a disruptive one, we can consider it as an opportunity to think about new approaches in our education system. It is apparent that the educational institutions which will embrace online platforms as long-term expansions for learning will thrive in the future [16]. Another study has identified several potential benefits of investing in online learning, including increased access, the enriched quality of learning, well-prepared students for a knowledge-based society, and lifelong learning opportunities [17]. Various research has shown that not only faculties, but also content, students, and the institutional context are important for an effective online education [14,18,19].

Even though Bangladesh Open University (BOU) has been offering secondary, higher secondary, Bachelor's and Master's degree programs via distance learning since 1992 through different modalities such as television, cell phones, text-based tools, and videos through a Learning Management System (LMS), almost no attempt has been made towards large scale online education in Bangladesh [20]. Hence, it is argued that online transition not only affects the students but also the educators. This is especially true in the case of Bangladesh, where most of the teachers have the experience with traditional face-to-face teaching practices, so it is quite problematic for them to be at ease with the sudden switch to remote teaching. In addition, educators of all levels of education lack the competency to design high quality study materials and to recognize suitable assessment mechanisms that can disrupt an effective transition. However, open educational resources such as MIT OCW, Udemy, edX, Udacity, Coursera, and the Khan Academy can be popular among educators at the tertiary level, but it is not really clear how popular it is among the elementary, primary or secondary level educators.

During the pandemic, the situation of formal education has changed dramatically. It is quite evident that as long as there are restrictions on normal life, the extent and duration of special arrangements taken due to COVID-19 in the education system will be continued. On top of that, returning to normal life most probably will not be a one-time transition, as jurisdictions will tend to assess the risks and take precautionary measures to mitigate the impact of multiple waves of the COVID-19 pandemic. In addition to accommodating institutional teaching-learning in emergency conditions, Bangladesh as an economically emerging country needs to continue its efforts to achieve the United Nations Sustainable

Development Goals (SDG) 2030, such as increasing the number of people with relevant skills, ensuring universal literacy and numeracy, and ensuring education for sustainable development as well as global citizenship through the continuation of formal education [21]. Hence, educational institutions need to serve as a positive catalyst for teaching students about sustainability and the changes it requires at all levels [22]. Education must therefore place a high priority on developing attitudes that promote reflection and critical thinking, as well as integrating sustainability-related themes within the curriculum [23].

In this context, institutions, teachers, and students are likely to look for flexible approaches for learning trajectories. This study was intended to find the existing challenges in teaching-learning during this pandemic, and the ways to mitigate the challenges. The different levels of the Bangladesh education system at present were reviewed through collected data, and potential recommendations were presented. In the context of a developing country like Bangladesh, it may be difficult to adapt to such a situation due to technological barriers. Until now, no study has been conducted to analyse the situation and to guide how to overcome obstacles. This study addresses this need and proposes an appropriate framework to mitigate the challenges.

For this study, the following research questions were taken into consideration:

i What are the traditional teaching-learning practices in the education system of Bangladesh?

ii What are the changes that have been incorporated in education practice due to the COVID-19 pandemic?

iii What are the challenges during crisis driven teaching-learning approaches?

iv What are the means that can help with the move towards a sustainable education system in emergency situations?

2. Methods

The study was conducted through the lens of the interpretive paradigm, because the interpretivism philosophy identifies and understands human experience in context-specific settings to explain observable facts [24]. In the adoption of a particular research methodology, this study primarily used mixed research methods. Here, both qualitative and quantitative approaches were integrated intentionally to address the research problem comprehensively. For this particular study, a Convergent Parallel Design was implemented [25]. This design involved the concurrent timing for implementing qualitative and quantitative phases together at the same time, and both of the phases were prioritized equally. Data were collected from 205 Bangladeshi students and 50 Bangladeshi teachers through semi-structured questionnaires using Google Forms over a period of 8 months, from September 2020 to April 2021. In addition, interviews were conducted with 11 parents (three primary level, three Secondary level, three Higher Secondary level, and two Tertiary level) over the telephone. The interviews with parents provided crucial information which supports quantitative data to determine students' living conditions, expectations of parents from educational institutes, and further areas to improve with regard to distance learning. Furthermore, Key Informant Interviews (KII) were conducted with 12 participants over the telephone who represent different stakeholders, such as the school administrator, the school managing committee representative, the public sector representative, as well as autonomous organization representatives from the National Curriculum and Textbook Board (NCTB), the National Academy for Educational Management (NAEM), the Primary Teachers Training Institute (PTI) Dhaka, the Government Teachers Training College (TTC) Dhaka, the Chairman of the Department, the Director of the Institute, and the Dean of the Faculty of different universities. Here, KII were used for collecting qualitative data or information about a particular topic or field from the participants who are experts or specialists in that area. The data were coded using a systematic procedure in which individual statements of interviews, KIIs and semi-structured questionnaires were examined and divided into themes against the major findings related to the research questions [26]. The collected qualitative data were recorded and then transcribed first into the Bangla

language and then translated into English. For more accuracy, the recorded interviews were rechecked after transcription by multiple authors. Subsequently, a deductive thematic analysis was conducted to find out the data related to the research questions.

For this study, data was collected from 50 teachers from public and private educational institutes, as presented in Table 1. Teachers responded from public and private organizations in a balanced manner. In addition, most of the teachers (more than 80%) have been involved in the teaching profession for more than 5 years. More experienced teachers were involved in the study to achieve a deeper understanding of the differences and challenges between traditional on-site/face-to-face and online educational approaches.

Table 1. Teachers profiles.

	Type of Institution			Teaching Experience				
Level of Teaching	Public, n (%)	Private, n (%)	Sub-Total, n (%)	<5 years, n (%)	5–10 years, n (%)	11–20 years, n (%)	>20 years, n (%)	Sub-Total, n (%)
Primary	2 (4)	4 (8)	6 (12)	0 (0)	6 (12)	0 (0)	0 (0)	6 (12)
Secondary	10 (20)	9 (18)	19 (38)	0 (0)	7 (14)	11 (22)	1 (2)	19 (38)
Higher Secondary	2 (4)	4 (8)	6 (12)	1 (2)	1 (2)	3 (6)	1 (2)	6 (12)
Tertiary	10 (20)	9 (18)	19 (38)	8 (16)	9 (18)	1 (2)	1 (2)	19 (38)
Total	24 (48)	26 (52)	50 (100)	9 (18)	23 (46)	15 (30)	3 (6)	50 (100)

Quantitative data were collected from 205 students for this study, as presented in Table 2. The gender balance between males and females was quite satisfactory. Moreover, student responses from public and private organizations were relatively balanced. The educational institutes were chosen selectively, while the students were chosen for the study on a random basis.

Table 2. Student profiles.

	Gender			Educational Institute Type		
Student Respondents	Male, n (%)	Female, n (%)	Total, n (%)	Public, n (%)	Private, n (%)	Total, n (%)
	108 (52.7)	97 (47.3)	205 (100)	101 (49.3)	104 (50.7)	205 (100)

While carrying out the qualitative research, NVivo 12.0 was adopted as a research instrument to manage data collection, to explore relationships among data, and to highlight emergent concepts. The collected quantitative data was analysed using SPSS version 25.0 software. A number of statistical tools such as frequency, mean, standard deviation, and Student's t-tests were used for analysing the data to explore and compare the students' perspective and experience of online education practices to that of the teachers. To strengthen the internal validity (credibility of findings) of this research, the triangulation method was supported through the use of multiple methods of data collection sources (questionnaires, interviews, and KII) to present the result in a coherent and reliable manner.

In terms of ethical considerations, the voluntary participation was ensured for each participant before conducting interviews and KII. Complete confidentiality and anonymity were ensured in presenting data in the data analysis section.

3. Findings

3.1. Existing Educational Practices and Infrastructure

According to Table 3, 60% of teachers responded that class size was more than 40 students per classroom per teacher, whereas approximately 44% of students had similar views. When students were further asked to opine about a teacher's control over a largely populated face to face class, approx. 54% of students responded that the teacher has a minimal amount of control over a large class size, as presented in Table 4.

Table 3. Student size per classroom per teacher.

	Student Number Per Classroom			
Respondents	**<40**	**40–70**	**>70**	**Total**
Teacher	40.00%	42.00%	18.00%	100.00%
Student	56.40%	38.20%	5.40%	100.00%

Table 4. Students' responses about teacher control over large face to face classes.

Does A Teacher Have Good Control over A Large Class?	**No**	**Yes**	**Total**
	53.70%	46.30%	100.00%

According to Table 5, the predominant teaching-learning activity that is practiced in Bangladesh is the lecture only-based method, which was indicated by approx. 87% of students and 60% of teachers, respectively. Other methods, such as laboratory or field work, group work, the communicative approach, the self-learning approach, etc. are also practiced, but the responses from teachers and students vary greatly about the method in practice. The primary reasons behind the variation in responses from teachers and students may occur due to the misrecognition of the students with regard to different approaches. Furthermore, other approaches reported by the teachers may seldomly be used in practice.

Table 5. Current teaching learning activities.

	Teaching Learning Activities			
Respondents	**Lecture Only**	**Laboratory/Field Work**	**Others (Group Work, Communicative Approach, Self-Learning Approach etc.)**	**Total**
Teacher	59.40%	27.50%	13.10%	100.00%
Student	87.00%	6.50%	6.50%	100.00%

According to Table 6, the assessment system consists mostly of both formative and summative assessment. Approx. 72% of the teachers stated that they emphasized both styles of assessment to in order to assess students' overall progress. However, when the teachers were further asked to opine about the percentage of formative assessment present in the assessment matrix, it was found that the percentage of formative assessment (in course quizzes, assignments, tutorials, presentations, projects, etc.) is on the lower side, and more than 70% of teachers expressed that the formative assessment percentage is equal to or below 30% of the total marks. A substantial summative assessment creates pressure on the students and makes it difficult to assess in case of emergencies, especially in online mode.

Table 6. Teachers' responses with regard to assessment technique.

Responses on Assessment Technique Types				Responses on Formative Assessment Percentage						
Assessment Types	**Formative**	**Summative**	**Mixed**	**Total**	**% of Marks**	**<10**	**11–20**	**21–30**	**31–40**	**>40**	**Total**
Responses (%)	8.2	20.4	71.4	100	**Responses (%)**	20.8	29.2	20.8	16.7	12.5	100

According to Table 7, more than 76% of teachers and 84% of students stated that their educational institutions have multimedia facilities, and the teachers use multimedia facilities quite regularly during teaching-learning practices. However, there is a contrasting view between students (4.9%) and teachers (16%) regarding the availability of multimedia facilities.

Table 7. Multimedia facility and usage.

	Multimedia Facility and Usage			
Respondent Types	**No Availability**	**Available but Rarely Used by Teachers**	**Available and Regularly Used by Teachers**	**Total**
Student	4.90%	11.10%	84.00%	100.00%
Teacher	16.00%	8.00%	76.00%	100.00%

In terms of internet availability and accessibility as presented in Table 8, 22% of teachers and approx. 13% students responded that their educational institutions have no internet availability. In addition, despite internet availability, 28% teachers and approx. 48% of students expressed that internet access was unavailable for them at their institute as a result of stringent institutional policies or a conservative mentality. A variation in responses from teachers and students may have been occurred due to students' reluctance to include ICT laboratory classes in the restricted access of internet category.

Table 8. Internet availability and accessibility.

	Internet Availability and Accessibility			
Respondents	**No Availability**	**Available but Access Restricted**	**Available and All Have Access**	**Total**
Student	12.10%	47.40%	40.50%	100.00%
Teacher	22.00%	28.00%	50.00%	100.00%

Students and teachers were asked for their opinions about the availability of alternative communication scopes other than direct classroom interactions. According to Table 9, 70% of teachers and approx. 86% of students expressed that there were alternative methods of communication other than direct classroom interactions. Both groups of respondents indicated that the means of these communications were telephonic, and via LMS, LMS like platforms, social media, and social communication networks, etc. We further dug down to explore the availability and utilization of LMS in educational institutions. According to Table 10, more than 60% of students and 54% of teachers expressed that there was no LMS or almost non-existent LMS in operation in the respective educational institutions.

Table 9. Teacher-student communication methods other than classroom interactions.

	Communication Methods Other than Classroom Interactions		
Respondents	**No**	**Yes**	**Total**
Teacher	30.00%	70.00%	100.00%
Student	14.10%	85.90%	100.00%

Table 10. LMS and its usage.

	Availability of LMS and Usage			
Respondent	**No LMS**	**Yes but Rarely Used**	**Yes and Being Used**	**Total**
Teacher	48.00%	6.00%	46.00%	100.00%
Student	42.40%	17.60%	40.00%	100.00%

3.2. Response to Crisis Due to the COVID-19 Pandemic

Students and teachers were asked to express their perceptions about the continuity of institutional educational practices amid COVID-19-like pandemic situations. Approx. 60% of the students and 38% of the teachers opined that the institutional educational activities cannot be continued as demonstrated, as shown in Table 11. An independent t-test was

performed, as students and teachers had substantial differences in their opinions. According to Table 12, since $p < 0.05$, we can conclude that the mean perception of continuing education is significantly different between teachers (M = 0.62, SD = 0.490) and students (M = 0.40, SD = 0.492).

Table 11. Perception towards the continuation of institutional educational activities.

Respondents	Can Institutional Educational Activities Continue during COVID-19 Pandemic like Situations?		
	No	**Yes**	**Total**
Teacher	38.0%	62.0%	100.0%
Student	59.5%	40.5%	100.0%

Table 12. Independent sample *t*-test (perception towards continuation).

		Independent Samples Test							
		Levene's Test for Equality of Variances		*t*-Test for Equality of Means					
		F	**Sig.**	**t**	**df**	**Sig. (2-Tailed)**	**Mean Difference**	**Std. Error Difference**	95% Confidence Interval of the Difference	
									Lower	**Upper**
Perception Continue Education	Equal variances assumed	0.472	0.493	2.774	253	0.006	0.215	0.078	0.062	0.368
	Equal variances not assumed			2.780	74.945	0.007	0.215	0.077	0.061	0.369

The contrasting responses regarding continuing education may represent the doubts among the students as well as the teachers regarding the preparedness of the current setup to be able to continue the formal education. Usually, our teachers have a large classroom of students to teach. A large class size makes the situation harder for teachers to employ interactive teaching-learning activities, as well as to assess them properly in online platforms. According to a Teachers' Training Center member[1],

> *"It is really difficult for teachers to assess the online assignments when the class size is large and there is no online structure during this pandemic time."*

Another important aspect mentioned by some interviewees was that the high cost of the internet can create an obstacle in reaching all the students via digital platforms. Furthermore, some families do not have the required digital devices to avail themselves of such an opportunity. When many families hardly earn enough to cover the living cost in this unprecedented time, the extra cost of the internet can be a burden for them. According to a Ministry of Education member[1],

> *"Cost of infrastructure, scarcity of resources, and mindset are the major obstacles to adopt technological resources".*

Besides the high cost of the internet, the teachers are also not trained enough to experience such a shift in teaching. According to an NAEM member[1],

> *"Poor internet as well high price of data are the real challenges. However, trainers and trainees need to be motivated to shift pedagogical changes".*

To continue with formal education during pandemic, the Government of Bangladesh had already considered the option to broadcast tele-classes on a national TV channel for the secondary school level and it was implemented immediately. Most of the education leaders as well as teachers were overly relying on the initiative taken by the Government of Bangladesh to broadcast tele-classes on national television channels to carry on the formal education activities for the secondary school level. According to a headteacher[1],

> *"We are not conducting classes through online, however, we are uploading the video of Sangsad TV on our institutional website".*

In this context, approximately 11% teachers and 12% students responded that no initiatives were taken by educational institutes to carry out formal educational activities, as shown in Table 13. However, some tertiary level educational institutes have taken on an array of initiatives to carry on formal education practices through live online classes on the Zoom or Google Classroom platforms, assignments over LMS, interacting via social media platforms, such as WhatsApp, Facebook, and YouTube, as well as by telephone. It can be seen in Table 13 that live online classes was the majority response by approx. 38% of teachers and 61% of students. In addition, social media interactions were reported by approx. 35% of teachers and 23% of students. Furthermore, approx. 18% of teachers and 5% of students responded that institutional activities were in continuation via assignments over LMS and telephonic interactions.

Table 13. Institutional initiatives to continue educational activities.

Respondents	Institutional Initiatives to Continue Educational Activities during the Pandemic					
	No Initiatives Taken	Live Online Classes on Zoom/Google Classroom	Interactions in Social Media Platforms (WhatsApp, Facebook, YouTube etc.)	Assignments over LMS	Telephonic Interactions	Total
Teacher	10.6%	37.7%	34.1%	9.4%	8.2%	100%
Student	11.7%	60.3%	22.9%	3.4%	1.7%	100%

In this pandemic, the need for mobile apps as well as web portals is increasing in order to support online learning. More than 60% of the interviewed parents stated that online classes/educational mobile apps/software can play a significant role in learning. According to a headteacher,

"Educational apps are highly recommended. We already have web portal".

In addition, interviewed parents, especially those of students in the primary and secondary levels, were much more ready to embrace online solutions, particularly those already in everyday use such as social media apps:

"WhatsApp group is now used to communicate with parents by the school. Mobile Apps may be used not only for emergencies but also for regular days. LMS can be beneficial."

Based on the responses in Table 13, we tried to find out the effectiveness of live online classes. Table 14 represents the responses. Approx. 24% of teachers and 9% of students found them helpful, whereas approx. 9% of students found them confusing. In addition, inadequate data bandwidth for an effective class was mentioned by approx. 12% of teachers and 19% of students. Furthermore, classes were frequently disruptive due to electricity issues reported by approx. 16% of teachers and students. Moreover, approx. 13% of teachers and 12% of students found the online classes less interactive, and approx. 11% of teachers and 16% of students find these classes difficult in terms of maintaining focus and control. In addition, approx. 11% of teachers and 13% of students expressed that these classes were costly, and approx. 16% of teachers and 10% of students reported that classes can be ineffective due to a shortage of ICT equipment. It can be implied that the students were less satisfied than the teachers regarding the effectiveness of real-time online classes. They highlighted inadequate data bandwidth, costly data, and a shortage of ICT equipment than those of teachers.

In addition, the Directorate of Secondary and Higher Education (DoSHE) has made an alternative assessment approach during this pandemic. DoSHE uploads assignments for class VI to X on the internet, and different schools have taken initiatives to provide assignments to primary level students through the internet or the WhatsApp group. After conducting the assignments, students need to submit the assignments to the respective class teacher on a specific date on the school premises. This sort of assignment submission process creates huge gatherings. This concern was highlighted by some parents:

"We are happy that the Government has made a plan to cover the content of the curriculum of most of the subjects by providing assignments each week. Interestingly, we are downloading assignments in online mode, and going to submit in-person. Absolutely baffling."

Table 14. Effectiveness of live online classes.

	Respondents	Teacher	Student
Effectiveness of Live Online Classes during Pandemic	**Helpful**	23.4%	8.7%
	Confusing	0.0%	8.7%
	Costly	10.3%	12.7%
	Less Interactive	13.1%	11.5%
	Difficult to keep focus	10.3%	15.7%
	Inadequate Data Bandwidth	11.7%	18.6%
	Shortage of ICT equipment	15.2%	9.1%
	Disruptive due to Electricity unavailability	15.9%	15.2%
	Total	100%	100%

We further tried to explore other strategies to facilitate the continuity of education. Students and teachers were also asked to give their views about some new strategies that can be adopted during the pandemic. According to Table 15, approx. 43% of teachers and 57% of students responded that broadcasts (pre-recorded video files) uploaded to YouTube, LMS and/or the website of the institution can be a great strategy for educational activities. Additionally, 13% of teachers and 27% of students shared those podcasts (pre-recorded audio files) uploaded in LMS and/or websites, and this can be another good strategy in this regard. Furthermore, 26% of teachers and 7% of students supported national TV channel programs, and 8% of teachers and approx. 6% of students responded that a special education page in the daily newspapers can be an effective strategy. In addition to that, 6% of teachers and approx. 2% of students responded that radio telecasting can be a strategy to adopt. The rest of the insignificant respondents expressed other strategies, such as the open use of online learning platforms, i.e., Coursera, and the use of community radio and live streaming, etc.

Table 15. Strategies can be adopted for the further continuation of educational activities.

Strategies to Continue Educational Activities during the Pandemic							
Respondents	**Radio Telecast**	**TV Channel Programs**	**Special Page on Daily Newspaper**	**Broadcasts on YouTube/LMS/Website**	**Podcasts on LMS/Website**	**Others**	**Total**
Teachers	6.0%	26.2%	8.3%	42.9%	13.1%	3.6%	100%
Students	1.7%	6.9%	5.5%	56.3%	26.8%	2.8%	100%

In addition, some departments of public universities have offered financial assistance to the students for them to purchase mobile data, supported by either donations from teachers or university and industry alliance programs. According to the Chaiman[1] of the department of a public university,

"We provided financial assistance to our students to purchase 30GB data/month because of students' financial hardships."

Furthermore, the University Grants Commission of Bangladesh ((UGC)) has provided all of the faculties of both public and private universities with a paid version of the Zoom platform to conduct uninterrupted online classes of 3 h for 300 students at a time. According to the Dean of a faculty of a public university,

"UGC has offered all the faculty members a paid version of Zoom platform at free of cost through Bangladesh Research and Education Network (BdREN) to conduct online teaching-learning activities for large class size."

However, various modalities and platforms of synchronous communication sometimes make the students confused because of technological incompetency. As one Chairman$_1$ of a public university firmly believes,

"There should be a centralized guideline for different stages of education to conduct online classes as well as assess students to minimize digital divide."

In terms of preference, interviewed parents preferred online classes via smartphones, as it is one of the most convenient ways to have access to the internet. However, most of the teachers find social media as an easily accessible platform for online classes. They also indicated that the duration of online classes should not exceed an hour in order to keep the students motivated. They have prioritized other interactive platforms such as YouTube, WhatsApp groups, Facebook, Zoom, and other mobile apps more than LMS. Interestingly teachers also highlight social media as an easily accessible platform for online classes. Going forward, it may be helpful to draw lessons from educators, students, and parents' use of social media in the development of LMS to draw on the best of the current practices.

We tried to find out how the respondents perceived the effectiveness of the uses of radio and TV channels, broadcasts and podcasts, and how they used newspaper or print media according to the outcomes of Table 15 as alternative strategies to continue formal education during a pandemic. Students as well as teachers mentioned some effective alternative educational strategies that are listed in Table 16.

Table 16. Perception of the effectiveness of alternative educational strategies.

Respondents		Effectiveness of Alternative Educational Strategies		
		Uses of Radio and TV Channels	Broadcasts and Podcasts	Use of Newspaper/Print Media
Teacher	Primary	12%	12%	12%
	Secondary	34%	34%	32%
	Higher Secondary	10%	12%	8%
	Tertiary	34%	36%	30%
Student	Higher Secondary	5.4%	8.3%	8.3%
	Tertiary	44.9%	83.5%	91.7%

Independent *t*-tests were performed, as students and teachers had substantial differences in their opinions regarding the effectiveness of the uses of radio and TV channels and the use of newspapers or print media as alternative strategies to continue formal education. According to Table 17, since $p < 0.05$, we can conclude that the mean of effectiveness of TV channels and radio is significantly different between teachers (M = 0.90, SD = 0.303) and students (M = 0.50, SD = 0.501). Additionally, as $p < 0.05$, we can conclude that the mean of the effectiveness of the newspaper is significantly different between teachers (M = 0.82, SD = 0.388) and students (M = 0.49, SD = 0.501).

Despite internet-based platforms being good solutions to continue teaching-learning activities, TV and radio can be utilized as effective platforms for mass education due to their low cost and availability. According to a NAEM member,

"Yes, Formal education can be continued in revised form. According to access and availability, Television is the best option to conduct the teaching-learning process. Audio-visual communication can be better served on TV than radio. However, the internet can be another medium where educational activity can be executed. Infrastructure and price somehow make online communication more challenging."

Table 17. Independent sample *t*-tests (effectiveness of the uses of radio and TV channels and of the use of newspapers).

		Levene's Test for Equality of Variances		*t*-Test for Equality of Means					95% Confidence Interval of the Difference	
		F	**Sig.**	**t**	**df**	**Sig. (2-Tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Effectiveness of the uses of radio and TV channels	Equal variances assumed	361.406	0.000	5.370	253	0.000	0.398	0.074	0.252	0.543
	Equal variances not assumed			7.184	123.041	0.000	0.398	0.055	0.288	0.507
Effectiveness of the uses Newspaper	Equal variances assumed	140.449	0.000	4.311	253	0.000	0.327	0.076	0.178	0.477
	Equal variances not assumed			5.028	93.262	0.000	0.327	0.065	0.198	0.457

It is worthwhile to mention that the government has already considered the option to broadcast tele-classes on national TV channels for the secondary school level, and it was implemented immediately. Despite mixed responses and levels of acceptance from students and teachers, as shown in Tables 16 and 17, we tried to find out the expectations of both students and teachers. Table 18 displays the frequency of TV programs appearing on national TV channels. The table implies that more than 70% of students and teachers would find it acceptable if the educational programs were broadcasted on national TV channels three to five times per week. Teachers and students were asked for their opinions about the duration of these educational programs. According to Table 19, 80% of teachers and approx. 75% of students responded that such educational programs should be more than 30 min, but should not exceed the 1 h mark. In addition, 16% of teachers and 20% of students responded that such programs can be more than 1 h, but should not be more than 90 min. In the case of tertiary education, different departments of the various universities are conducting classes at their convenience in accordance with the university policies; however, the online classes and support vary from faculty to faculty, as well as university to university. Some private universities have pre-existing LMS including Moodle in order to engage, communicate, and disseminate resources to students. Some educational institutional leaders have mentioned that it is time for all levels of educational institutions to seriously consider this option. According to the parent$_1$ of a secondary level student,

> "WhatsApp group is now used to communicate with parents by the school. Mobile Apps may be used not only for emergency but also for regular days. LMS can be beneficial".

Table 18. Expected frequency of educational programs on national TV channels.

	Expected Frequency of Educational Programs				
Respondents	**Once Daily**	**Twice Daily**	**Once in Every Alternate Day**	**Once in A Week**	**Total**
Teacher	30.0%	20.0%	40.0%	10.0%	100%
Student	31.2%	19.0%	40.5%	9.3%	100%

Table 19. Duration of educational program.

	Expected Frequency of Educational Programs				
Respondents	**30 min to 1 h**	**1 h to 1 h 30 min**	**1 h 30 min to 2 h**	**More than 2 h**	**Total**
Teacher	80%	16.0%	2.0%	2.0%	100%
Student	74.6%	20.0%	3.9%	1.5%	100%

Teachers were asked about the availability of ICT equipment at their disposal, in addition to ICT exposure. Table 20 lists their responses. Some 82% of teachers had individual ICT equipment, with 80% indicating that they had provided the equipment themselves. In terms of familiarity with ICT, 38% of teachers had no to a basic level of exposure, with 44% having a moderate exposure. It does appear that institutional and governmental support was accessed to address training needs with institutions and/or government arranged ICT training for 55.5% of teachers. It is significant that 18.5% of teachers indicated that they sought out training independently. In addition, students were asked to comment on the availability and types of ICT equipment in their homes. The responses are listed in Table 21. Approx. 94% of students had access to technological devices at home, and in most cases, those were smartphones. Levels of access to laptops, desktop computers, and tablets were much lower than they were for smartphones.

Table 20. Teachers' responses with regard to ICT equipment, exposure, and training.

Responses of Teachers about ICT Equipment, Exposure and Training	Availability of Individual ICT equipment	Yes	82%
		No	18%
	ICT equipment provided by	Self-arranged	80%
		Institution-arranged	20%
	ICT Exposure	None	2%
		Basic	36%
		Moderate	44%
		Advanced	18%
	Formal ICT Training	None	26%
		Self-arranged	18.5%
		Institution-arranged	29.3%
		Govt. Provided	26.2%

Table 21. Students' responses about the availability and types of ICT equipment at home.

Responses of Students about the Availability and Types of ICT Equipment at Home	Availability of ICT equipment	Yes	93.7%
		No	6.3%
	Types of ICT equipment	Smart Phones	56.8%
		Tablet Computers	5.6%
		Laptops	25.0%
		Desktop Computers	12.5%

The educational institution leaders that were interviewed, both in public and private institutions, acknowledged that the main problems in continuing formal education during the pandemic were the lack of IT training for teachers to conduct teaching-learning activities on digital platforms and the lack of IT facilities and infrastructure. Even if some institutions have the facilities, those are not accessible to all of the teachers and students. According to a School Administrator of a secondary school,

"We have adequate technical facilities. However, we use this facility only during ICT laboratory classes. We think that by following this method we can prolong the life of our equipment".

Some interviewees indicated that internet and digital platforms can play a significant role in this context for the secondary, higher secondary, and tertiary level; however, it is not possible to employ this solution nationwide. According to a school management committee member[1],

"No infrastructure is available in the school premises. Besides, teachers are not trained enough to conduct online classes, hence, they are not ready to adopt pedagogical shifts."

However, some problems may arise in employing LMS. Not all of the institutions, especially public institutions, have the ability to run LMS at this moment. According to an NCTB Member[1],

> *"LMS is highly needed, we should start, but not mandatory right now as we are not ready at all to implement LMS just now".*

It has also been mentioned by some interviewees that the high cost of the internet can create an obstacle in reaching all of the students via the digital platform. Furthermore, some families do not have the required digital devices to avail themselves of such opportunities. When many families hardly earn enough to cover the cost of living in this unprecedented time, the extra cost of the internet can be a burden for them.

3.3. Readiness of the Current Situation and Expectations Beyond

The current education system is not sufficient and sustainable enough to tackle this unprecedented situation due to infrastructure and resource shortages. Though the Government of Bangladesh has taken the initiative to conduct teaching-learning activities through TV broadcasting, due to the non-interactive mechanism of TV, the learning outcome may not reach the expected levels. According to an NCTB Member[1],

> *"Current situation may divide students of the same class into different learning skills, so a holistic plan is needed. Initiating blended learning in regular days ensuring maximum use of technological infrastructure may consider mobile data price. TV is basically lecture based and not suitable for students of different competencies. Interactive online mode is the ultimate solution."*

Amid the outbreak and spreading of COVID-19, an Education Ministry member[1] expressed a strong commitment to supporting distance education:

> *"If the decision is made to continue teaching-learning in distance mode, teachers will make themselves ready. Teachers will manage themselves to be equipped with. If a decision is made, initiative may be taken; at the introducing stage nothing can be accurate."*

However, students' interest and motivation, in addition to teachers' technological as well as pedagogical skills, are important prerequisites for an effective online education. The public university faculties claimed that they were provided with a variety of pedagogical training in addition to technical training sessions. They also received texts as well as video tutorials from experts to conduct teaching-learning activities and to assess students. As one dean of a public university stated,

> *"Though we have arranged some sessions based on technology as well as pedagogy for our faculty members, they are not confident enough to maximize the students' learning outcome."*

A departmental chairman of a private university stated that

> *"Self-motivation and autonomy of students are very important for online education. But unfortunately, our students are not self-directing enough."*

In addition, faculties are facing pedagogical challenges to cope with the new teaching-learning process. As a director of a public university stated,

> *"Faculty members especially elderly and non-science faculties have been facing challenging to conduct online classes due to lack of technical skills."*

On the other hand, a real-life issue in dealing with online teaching-learning is large class sizes. Large class sizes makes the situation harder for teachers to employ interactive teaching-learning activities, as well as making it more difficult to assess the students properly. Students usually do their assignments using pen and paper, and then they capture images of the answers using a mobile camera and submit these via email, WhatsApp, or Facebook Messenger. This highlights the lack of opportunities and skills to implement interactive teaching learning approaches like groupwork, discussions, and online quizzes.

In addition, some public sector representatives expressed their doubts as to whether students of primary and secondary levels are capable enough to download and submit

assignments through online platforms using different types of electronic devices. According to a public sector representative,

> *"Students of Primary and Secondary level have limited IT exposure. Can they really complete online assignments of their own?"*

Moreover, in our existing curriculum, we have less scope for primary level students to be introduced to ICT in education. According to a PTI member,

> *"As the students of primary level are academically unexposed to IT based education, how logical for them to perform assignments in online mode?"*

Lastly, creating a proper learning environment for students is also a vital issue for effective online education. Many students do not even have a space from where they can participate in the class. As a chairman of a public university said,

> *"Some of the students live in a small space with their family where they do not have a proper environment to concentrate in the class. In addition, sometimes they need to go outside from home due to poor internet network. These sorts of activities hinder proper learning environment."*

Furthermore, students and teachers were asked to express their opinions about the readiness of the current educational system to carry on formal education without the traditional methods and via alternative strategies. According to Table 22, a total of 86% of teachers and 75% of students responded that the current educational system is not equipped to continue with the requirements of formal education by adopting alternative strategies, and vice versa. Since $p > 0.05$, we can conclude that the mean of the readiness of the current educational system to carry on formal education is not significantly different between teachers (M = 0.14, SD = 0.351) and students (M = 0.25, SD = 0.433).

Table 22. The readiness of the current educational system to carry on formal education.

Respondents	Is the Current Educational System Ready to Carry on Formal Education Via Alternative Means?			
	No	**Yes**	**Total**	**p-Value**
Teacher	86%	14%	100.00%	0.1
Student	75.1%	24.9%	100.00%	

Teachers were also asked to share their views about the possible reasons behind the lack of readiness of our current educational system with regard to the adoption of new strategies. Table 23 lists the possible reasons expressed by the teachers in descending order. The possible reasons expressed by the teachers were the lack of proper training, poor socio-economic conditions, the lack of internet availability and speed, the shortage of ICT equipment, students not being exposed to technology, and the disruption of electricity are major factors identified by the teachers.

Our survey culminated in asking teachers to express their expectations from the government and private sectors with regard to contributing to the continuation of formal education during the pandemic. Table 24 lists the responses of teachers about the possible roles of the government and private sectors in this regard in descending order: The government can play an important role in developing ICT infrastructure (31.7%), in providing free internet for students and teachers for educational purposes (30.8%), in dedicating education hours in TV and radio channels mandatorily (25%), etc. On the other hand, the private sector can also contribute significantly by helping develop ICT infrastructure (25.2%), donating ICT equipment (23.9%), helping develop educational programs for TV and radio (16.4%), donating to the local educational institute's LMS development (13.2%), etc. Similarly, some KII participants stressed the need for a holistic plan to bring changes to the present education system with the help of technology and interactive online education. According to a NAEM member[1],

"Government can go for a strategic plan along with focusing on internet price, software training, and counselling."

Table 23. Teachers' responses about the possible reasons behind the lack of readiness of our current educational system.

Reasons behind the Lack of Readiness	Responses	Rank
Teachers are not properly trained	13.1%	1
Poor socio-economic condition	12.7%	2
Lack of internet speed	11.9%	3
Shortage of ICT equipment	11.0%	4
Students are not technologically ready	10.6%	5
Internet unavailability	10.2%	6
Discontinuous electricity	8.5%	7
Lack of funds	7.2%	8
Educational content needs upgrading	7.2%	9
No alternate platforms	4.7%	10
Negative public mindset	3.0%	11

Table 24. Teachers' responses about the expected contributions from the government and private sectors regarding the continuation of educational activities.

	Possible Contributions	Responses
Role of govt.	Develop ICT infrastructure	31.7%
	Free internet for education	30.8%
	Dedicate education hours in TV and radio channels	25.0%
	Subsidize newspapers for educational pages	10.8%
	No role	1.7%
Role of private sector	Help develop ICT infrastructure	25.2%
	Donate ICT equipment	23.9%
	Help develop educational programs for TV and Radio	16.4%
	Donate to the local educational institute's LMS development	13.2%
	Bear educational expenses for TV and radio	12.6%
	Patronize newspaper page costs for education	8.8%
	No role	0.0%

Moreover, the private sector may come forward by reducing internet prices, software training, and television broadcasting. According to an NCTB Member[1],

"Private sectors can play significant roles by introducing dedicated TV channel programs, reducing internet tariff, patronizing online schools and supporting the development of infrastructure."

4. Challenges

From the collected data, it has been observed that the educational institutes tend to follow more of a traditional face-to-face teaching-learning approach. The lecture method was mostly used for teaching, and the students seemed used to their role as passive learners

in the process. One probable reason for such a practice has been drawn from the data set. Overpopulated classes may compel teachers to employ the lecture method over the participatory method, as the latter can be difficult to put in practice.

Educational institution leaders, both in public and private institutions, acknowledged that the main problems in continuing with formal education during the pandemic are the lack of IT training for teachers to conduct teaching-learning activities on digital platforms, and the lack of IT facilities and infrastructure. Several studies also emphasized the scarcity and incompetent management concerning IT infrastructure as two of the key barriers to conducting teaching-learning activities during emergencies [27,28]. Even though almost 75% of the teacher participants in this study received ICT training, the training was mostly focused on using multimedia in teaching learning activities. Apparently, they did not receive training to conduct classes on interactive digital platforms. Most of the education leaders and teachers are overly relying on the initiative taken by the Government of Bangladesh to broadcast tele-classes on national television channels to carry on the formal education activities for the secondary school level. Some interviewees have indicated that internet and digital platforms can play a significant role in this context for the secondary, higher secondary, and tertiary levels; however, it is not possible to employ this solution nationwide. Most of the educational institutions do not have proper IT facilities, and even if some institutions have the facilities, those are not accessible to all of the teachers and students. In some organisations, only the teachers are allowed access to IT facilities, but, unfortunately, not all of the teachers are trained in the proper and efficient use of those facilities. This barrier is also supported by other studies in the same context [8,29].

It has also been mentioned by some interviewees that the high cost of the internet can create an obstacle in reaching all of the students via digital platforms. Moreover, some families do not have the required digital devices to take advantage of such an opportunity. When many families hardly earn enough to cover the living cost in these unprecedented times, the extra cost of the internet can be a burden for them. The problem related to the high cost of internet data packages required to continue with a digitalized education was supported by other studies [30].

A few more challenges have been discovered that may hinder educational activities due to the pandemic. The most crucial issue, in this context, is the shortage of teachers who are skilled in online teaching. Even though the government has taken initiatives to educate the teachers how to employ ICT in teaching-learning activities, Bangladesh still has a long way to go. Furthermore, not all of the institutes are equipped with the required technological infrastructure. However, training the teachers alone does not solve the problem. Access to the internet is another issue here. Almost half of the students do not have the appropriate devices or connections to participate in online learning. In addition, the cost of an internet connection can play a negative role in this context. Several studies also identified technological barriers as one of the key hindrances to continued education in emergencies [31,32]. Another challenge to run the educational activities smoothly could be overpopulated classes. From the qualitative data collected from the students of the secondary and higher secondary levels, it has been seen that the average number of students in a class is approximately 40. In some institutions, the number of students often exceeds 60. Determining appropriate teaching-learning practices for such huge classes and implementing that accordingly can be a very daunting task as well.

5. Ways to Improve Teaching-Learning Activities during Pandemic and Emergency Conditions

To continue with a formal education during the pandemic, the Government of Bangladesh started broadcasting tele-classes on national TV channels for the secondary school level. In addition, the Government focused on weekly assignments to continue formative assessment instead of summative assessment for the secondary level students. For the primary section, most of the institutions opted for homework-based assessments. Many schools could not employ online education in practice due to the lack of infrastructure and skilled human

resources. These schools have been heavily dependent on the initiative taken by the government to broadcast tele-classes. However, there were some institutes that had the capacity and resources to introduce online classes for their students. Even some institutions had developed an online LMS for themselves. They regularly uploaded educational instructions and assignments on their system and maintained communication with the students and parents through LMS.

In this pandemic, the necessity of the LMS was pointed out by some educational institutional leaders. They have mentioned that it is time that the educational institutions considered this option seriously. Similarly, most of the student and teacher participants stated that LMS can be an option in this current pandemic. However, some problems may arise with regard to employing LMS at present. Not all of the institutions, especially public institutions, have the ability to run LMS at this moment. Furthermore, the major problem is the high cost of the internet in Bangladesh. In addition, the teachers are not sufficiently trained to experience such a shift in teaching. Funding to maintain such a platform is another issue. Almost all of the institutions are looking forward to receiving government funding or private donations so that they can take such steps. At this stage, it is quite clear that ensuring proper IT training for teachers, and easy and cost effective access to the internet are the foremost priorities in terms of sustaining LMS. Otherwise, it may not be beneficial. It is better to indicate here that most of the interviewed parents were not very enthusiastic about LMS. They have prioritized other interactive platforms, such as YouTube, WhatsApp groups, Facebook, Zoom, and other mobile apps above LMS.

Both the students and the teachers are in a confused state about the continuation of formal education along with the readiness of the current education system to accommodate these pedagogical shifts. However, pre-recorded educational broadcast files or videos on YouTube, LMS, or websites can be an effective strategy to satisfy these needs. For limited internet bandwidths, podcasts can also be employed. Furthermore, the persistent use of TV programs of short duration and at convenient intervals can gradually attract students and encourage them to follow new paradigms. Moreover, the print media can become a supplementary strategy that may require time and efforts from many corners.

Educational institution leaders, both in public and private institutions, have acknowledged that the main problems in continuing formal education during the pandemic are the lack of IT training for teachers to conduct teaching-learning activities on digital platforms and the lack of IT facilities and infrastructure. Not only the government, but also other stakeholders such as NGOs and private organisations can play their part to train the teachers in a sustainable way. Furthermore, the educational institutes should place emphasis on developing the technological infrastructure to initiate remote learning.

6. Proposed Framework in COVID-19 like Emergency Situations for the Continuation of Formal Education in Bangladesh

This study intended to suggest a sustainable education system which would make formal education accessible for all in the time of the COVID-19 pandemic and similar emergency situations. Based on the quantitative findings and analyses of interviews from the parents of students of different education levels and insights from KIIs; the protocol presented in Table 25 has been recommended for the continuation of the formal education system during the contingency periods like the COVID-19 pandemic in Bangladesh.

Table 25. Proposed protocol.

Education Levels	Current Lesson Strategy	Current Logistics	Emergency Lesson Protocol
Primary (Preschool—class V)	Classroom based lectures	• Students have no online exposure. • Schools have limited IT infrastructure and experience.	• Broadcasting on TV channels, electronic media, and radios on a definite time schedule on a rotating basis. • Daily/weekly newspapers/print media can dedicate pages in a similar way. • Development of LMS/phone-based apps/software and/or IT platforms to host, track and monitor educational and administrative materials and conduct online classes.
Secondary (Class VI to SSC)	Classroom based lectures + weekly or fortnightly Laboratory sessions	• Students have minimum online exposure. • Schools have moderate IT infrastructure and experience.	• Broadcasting on TV channels, electronic media, and radios on a definite time schedule on a rotational basis. • Daily/weekly newspapers/print media can dedicate pages in a similar way. • Development and utilization of LMS.
Higher Secondary (HSC)	Classroom based lectures + weekly or fortnightly Laboratory sessions	• Students have moderate online exposure. • Colleges have moderate IT infrastructure and experience.	• Daily/weekly newspapers/print media can dedicate pages for learning. • Development and utilization of LMS. • Asynchronous digital learning (not real-time: podcasting at lower internet BW areas, video streams on YouTube or LMS).
Tertiary	Classroom based lectures + Laboratory Works/Field studies	• Students have matured online exposure. • Universities have moderate to workable IT infrastructure and experience.	• Development and utilization of LMS. • Asynchronous digital learning (not real-time: podcasting at lower internet BW areas, video streams on YouTube or LMS) • Synchronous digital classroom management via Google Classroom, online classes via Zoom/Cisco, WebEx, Microsoft Teams, channels etc. can be deployed.

7. Limitations of the Study

One of the major drawbacks of the study is that only those who had online access could respond via Google Forms. We had no option but to pursue online options exclusively in the collection of data due to the pandemic. In addition, we failed to collect data from students of primary and secondary levels due to their lack of IT exposure. Furthermore, we found that approx. 93% of students had access to ICT equipment, but the reality may not conform to the statistics. As Bangladesh is a middle-income country, and since most of the people live in rural areas, the availability and affordability of ICT equipment are challenging propositions. Due to the online-based data collection paradigm, their inputs might have been missed.

8. Conclusions

This study showed that the impact of the COVID-19 pandemic on the formal education system of Bangladesh is formidable. Even though Bangladesh started employing ICT in education before the pandemic, full IT deployment could not be introduced in all of the levels. Many institutions are still dependent on traditional on-site/face-to-face teaching/learning approaches. However, the pandemic has compelled us to introduce modern approaches in the area of formal education. Remote learning has become the only option to continue formal education. Hence, tele-classes and online classes have become the 'new normal' to mitigate the challenges because of the pandemic. Unfortunately, there is a lack of both pedagogically and technologically competent human resources, as well as technological infrastructure. But this situation can be improved by utilizing initiatives from both governmental and non-government bodies, and other stakeholders. To ensure accessibility to the internet for everyone nationwide, the government can opt to reduce the cost of the internet. In addition to this, the educational institutions should stress the development of human

and technological resources in order to adapt to change. Furthermore, LMS can ultimately be introduced at all levels. Such a system or network can be highly impactful in maintaining organisational communication and can provide students and parents with the necessary educational instructions. This can also make the process of assessing students and creating reports and other documentation transparent and time efficient. In addition, using Zoom or Skype online classes, television, broadcasts or podcasts, radio, newspapers, etc. can be used for educational instruction and communication, if necessary. In the context of distance learning, it is crucial to consider the learning environment as well. If the students do not have the proper environment to concentrate or continue their learning activities, no matter how well produced the digital/distance learning materials, ensuring the effective transmission of knowledge will be difficult. Students' living conditions can play a significant role in distance/online education. For a well-developed educational framework which would be suitable for such emergency contexts, this study recommends the running of a pilot program in accordance with these suggestions. Based on the outcome of the pilot program, the framework can be implemented nationwide with the necessary amendments.

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