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e-Learning as a Doubled-Edge Sword for Academic Achievements of University Students in Developing Countries: Insights from Bangladesh

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Abstract: e-Learning is popular in various developed countries, but it is still underutilized in many developing countries. During COVID-19, when technology was utilized to overcome these obstacles in delivering education globally, e-Learning became widespread in developing nations. In turn, this promoted e-Learning in all types of educational institutions, specifically in higher-level institutions, such as universities. e-Learning has become vital to students' learning and academic achievement. Despite the positive global impact of e-Learning, Bangladesh's situation is quite different. Where socio-economic inequality and the digital divide are pervasive, it results in unequal learning gains and opportunities for university students. Consequently, this affects students' academic achievements. Despite the importance of the topic, there is an existing knowledge gap. This study aims to fill the gap by investigating the effect of e-Learning on the academic achievements of university students in Bangladesh. The study utilizes a mixed methodology. A total of 275 university students participated in this study. The findings of this study demonstrated that students lack access to technological devices and digital literacy, which, in turn, has negatively affected their academic achievement in conjunction with the advancement of e-Learning. Hence, this study recommends that the government offset adverse effects to ensure students utilize e-Learning appropriately.

Keywords: e-Learning; higher education; digital divide; university students; Bangladesh



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1. Introduction

e-Learning has existed for a prolonged time in different parts of the world. However, e-Learning has been a distant dream in many developing countries. Unpredictably, the COVID-19 pandemic spread over the world. The governments of countries worldwide moved fast and decisively to protect their citizens from the health risks posed by the sickness and to reduce the number of people infected with it. Worldwide lockdowns and social distance regulations were implemented, and many physically demanding activities were put on hold. There was no possibility for education to be provided in a conventional manner, such as through physical classrooms, as educational institutions at all levels and in every region of the world were shut down, mirroring the course of events in many other fields' endeavors. At that time, people worldwide started adopting and utilizing previously developed technology at an accelerated rate to lessen the impact of these worldwide limits. Educational establishments all around the globe have been under pressure to adopt innovative teaching methods and use emerging technologies; one such technology is e-Learning. The most significant and drastic adaptation and utilization of e-Learning occurred in developing countries during the COVID-19 period. These countries now utilize e-Learning at different educational levels and activities [1,2]. As time passed, the

significance of e-Learning for students' learning gains and academic advancement became increasingly crucial. This trend continued even after the COVID-19 period ended [3–5].

The significance of e-Learning, its positive impact on students' learning gains, the availability of educational opportunities, and the effect it has on complementing academic accomplishments are recognized and accepted in every region of the world. This is true because its significance is universally known and understood. On the other hand, the circumstance is different in Bangladesh. At every level of education in Bangladesh, the socio-economic situations of the students are very different. The parent's financial position substantially impacts various issues relevant to the child's access to educational opportunities. In addition, there is a wide disparity in the educational opportunities open to each person due to the inadequate application of social justice. In addition, the financial circumstances of many students are insufficient to allow them to acquire the necessary digital technology and services to use and benefit from the education provided through e-Learning [6].

The digital divide has emerged as a consequence of the circumstance. In addition, many students do not have adequate knowledge of utilizing e-Learning since there is no unified educational curriculum focusing on it, and only a few expensive education curricula meet the requirements for teaching digital literacy. Consequently, students who lack digital literacy and cannot afford digital equipment and services cannot make full use of the learning and educational opportunities that have become available as a direct result of the advancements made in educational technology, such as e-Learning. As a consequence of this, it frequently has a negative impact on their academic achievements. Even though e-Learning has various records of positive effects on students' learning gains and educational opportunities, students in Bangladesh of all educational levels are frequently unable to utilize these innovations to improve their academic performance. Primarily due to Bangladesh being home to a large number of obstacles. Due to this, there has been a considerable increase in the number of students across the country who choose not to continue their education or who take time off between school years as a direct result of the aftereffects of COVID-19, and the introduction of new educational technologies, such as e-Learning. In addition to the challenges already present in education due to e-Learning, there is also a dearth of programs for developing skills offered by both the government and educational institutions. Due to this, university students will be prevented from attaining their full potential and will be less prepared for employment, which is especially problematic today when technology-based skills are highly sought across the globe [7,8].

The relevance of e-Learning in education is growing daily, and it is abundantly clear that its significance will only grow to an even greater degree in the years to come. As a direct result, its influence on students' academic progress will continue to grow. In this age of globalization, it is possible to consider this impact to be felt worldwide, and it will be experienced by every nation [9,10]. However, due to the wide range of socio-economic conditions and cultural norms worldwide, how each country acknowledges and addresses the problem may differ significantly. Such e-Learning advancements may have a negative impact on students' learning gains, educational opportunities, and academic achievements in developing nations, such as Bangladesh, where access to digital technology and the internet is frequently regarded as a luxury. This is especially true for university students, who have been the most dependent on e-Learning advancements in recent years. In addition, while fully aware of the pre-existing conditions that include a lack of social justice, the digital gap, technological growth in education, and impediments to academic success in the country, the government has not yet taken any severe action.

Past literature has shown that there has been an accelerated adaptation and utilization of e-Learning in education and that it has many positive aspects. The literature also shows that for developing countries, such as Bangladesh, the full potential of e-Learning in education is hindered due to the diverse socio-economic conditions and the prevalence of the digital divide. Moreover, the existing literature showcases that e-Learning in education has caused a transformation in the delivery of education, which all cannot acquire due to

socio-economic conditions and the digital divide. Hence, it can be said that e-Learning acts as a doubled edge sword for the academic achievements of university students in developing countries, such as Bangladesh. Additionally, the University Grant Commission of Bangladesh (UGC) hopes to emphasize more on the use of technology in higher educational institutes (HEIs). Hence, it is crucial to identify all the factors that might benefit and hinder the students learning and academic achievements [11].

Moreover, most of the previous works have only focused on the positive sides of e-Learning in developing countries. Rarely has there been any prior work on how e-Learning in education has affected students' academic achievements, particularly university students in developing countries. Hence, this has created a knowledge gap. Therefore, this study aims to fill the knowledge void, utilizing the technological determinism theory and the reflective theory of education. Moreover, the study intends to find responses to the following research questions:

RQ1: To what extent do university students' access to technological devices and the digital divide affect e-Learning?

RQ2: To what extent do university students consider technological advancement, such as e-Learning, adversely affects their academic achievements?

2. Background of the Study

Previous literature has pointed out in various cases that there is a persisting digital divide, social injustice, and increased technology usage, such as e-Learning, in Bangladesh.

2.1. Persisting Lack of Social Justice and Digital Divide

Significant shifts have taken place in Bangladesh's educational landscape in response to the global resonances of globalization, internationalization, and an increase in the transnational migration of academics worldwide. According to Alam (2021), unprecedented changes have occurred in some instances over the past few decades [12]. These changes have frequently appeared in a manner distinct from that of other countries within the region and internationally. Works by Farah and Upadhyay (2017) and Milon et al. (2018) expressed that, over the years, the country's education system has achieved a higher enrolment rate and gender parity, which has contributed significantly to the welfare of its citizens and the nation as a whole [13,14]. These findings were based on the country's education system has improved over the years. Despite these achievements, there is still a lack of social justice, and various socio-economic conditions impede the provision of quality and universal education in the country. The country's historically poor socio-economic state has long been a significant barrier to providing education, frequently cited as contributing to the high school dropout rate. In addition, there is not a consistent level of access to high-quality education across the country. Titumir (2021), Dutta and Smita (2020), and Emon et al. (2020) all emphasized the existing inequality and poverty still exist in the country [15–17]. They have further stated that many students cannot access education properly due to inequality and poverty. Hence, this limits the student's learning and growth as an individual. Moreover, the inequality and poverty in the country have created more problems for the students, which has resulted in a lack of social justice in education. The lack of social justice in education has severely limited the choice and accessibility of education institutes, the quality of education associated with it, and the available types of education or knowledge that the students can gain states Alam and Forhad (2021), Sultana et al. (2021), and Aziz (2020) [18–20]. However, that is not all; there is also an existing digital divide in the country. More and more students do not have the financial stability to own technological devices that can connect to the internet, nor do they have access to a fast and uninterrupted internet connection. Moreover, in many places, even with financial stability, the students do not have access to continuous internet connections due to a lack of coverage, which is due to the infrastructural limitations of the country. These factors of the digital divide are reported in the studies by Mathrani et al. (2022), Saha et al. (2021), Shohel et al. (2021), and Islam and Inan (2021) [7,21–23]. Another issue

that has accompanied the digital divide and plagued students for a long time is the lack of digital literacy. It is primarily due to the lack of integration of digital literacy learning in all Bangladesh education levels. As a result, many students struggle significantly when using digital devices or completing their academic tasks through technology [6].

2.2. Accelerated Adaptation of Technological Advancement, Such as e-Learning, in Education

The use of technology in education has been prevalent in many parts of the world. However, providing access to quality education to all is still a challenge for developing countries. Hence, many developing countries have never even thought of implementing the use of technology in education. However, this scenario changed drastically when the COVID-19 pandemic hit the world. Traditional education delivery methods were no longer available, and most countries shifted to using technology to deliver education. Since then, many developing countries have been using technology in various capacities at different education levels [24]. The same applies to Bangladesh. The use of technology, particularly e-Learning, took off at an accelerated pace in the country. Both Al-Amin et al. (2021) and Bashir et al. (2021) found in their research that many universities in Bangladesh are now entirely utilizing e-Learning to maximize the delivery and quality of education [25,26]. Moreover, various initiatives and incentives are being provided by the government to promote the use of technology in education, specifically in HEIs, such as universities. As more and more use of technology is involved at universities, the students will be required to have access to technological devices, fast and uninterrupted internet connections, and digital literacy to properly utilize these facilities provided by the new initiatives taken by the government and educational institutes. Chowdhury (2019), Lim et al. (2020), Al-Amin et al. (2021), and Shohel et al. (2022) suggest that the use of technology, specifically at HEIs, such as university, can increase students' learning outcomes and quality of education in Bangladesh [25,27–29]. However, these studies have failed to consider the lack of social justice and the existing digital divide. Hence, even if technology and digitalization of education increase the quality of education and learning outcomes, its benefits will be limited due to the various socio-economic factors involved with accessing education and e-Learning. Consequently, these factors might combine to affect the student's academic achievements as well, reports Saiful Islam (2020), Akter (2021), Alam and Islam (2022), Hoque et al. (2021), and Badiuzzaman et al. (2021) [30–34].

3. Theoretical Framework

The idea that technical breakthroughs can have both positive and negative effects on society is a central tenet of the theory known as technological determinism. This theory proposes that advances in technology bring about social and cultural shifts. It suggests that technology is the fundamental force that forms and impacts human behavior and society and is mainly responsible for how humans think, communicate, and connect. This is the central tenet of the technological determinism theory [35].

In addition, the reflective theory of education is a teaching and learning approach emphasizing the critical analysis of experiences to generate new knowledge and insights. Reflective practice is another name for the reflective theory of education. The foundation of the reflective theory of education is the idea that learning is an ongoing process and that individuals should regularly engage in reflective thinking to evaluate their development and locate areas in which they can make improvements is the foundation of the reflective theory of education [36].

Due to this, this study believes that e-Learning has both positive and negative sides in how it influences the academic achievements of university students. This conclusion is based on the theoretical and empirical background of the technological determinism theory and the reflective theory of education. In addition, this study believes improvements can be made by considering these two aspects. As a result, this research will make a theoretical contribution by highlighting the benefits and drawbacks of e-Learning for the

academic achievement of university students in developing nations and the potential paths for their migration.

4. Conceptual Framework

The accessibility to technology, digital literacy, and the ability to complete the assigned tasks on e-Learning platforms affect university students' academic achievements. This study examines the students' perceptions regarding these factors, and Figure 1 illustrates the conceptual framework used in this study.

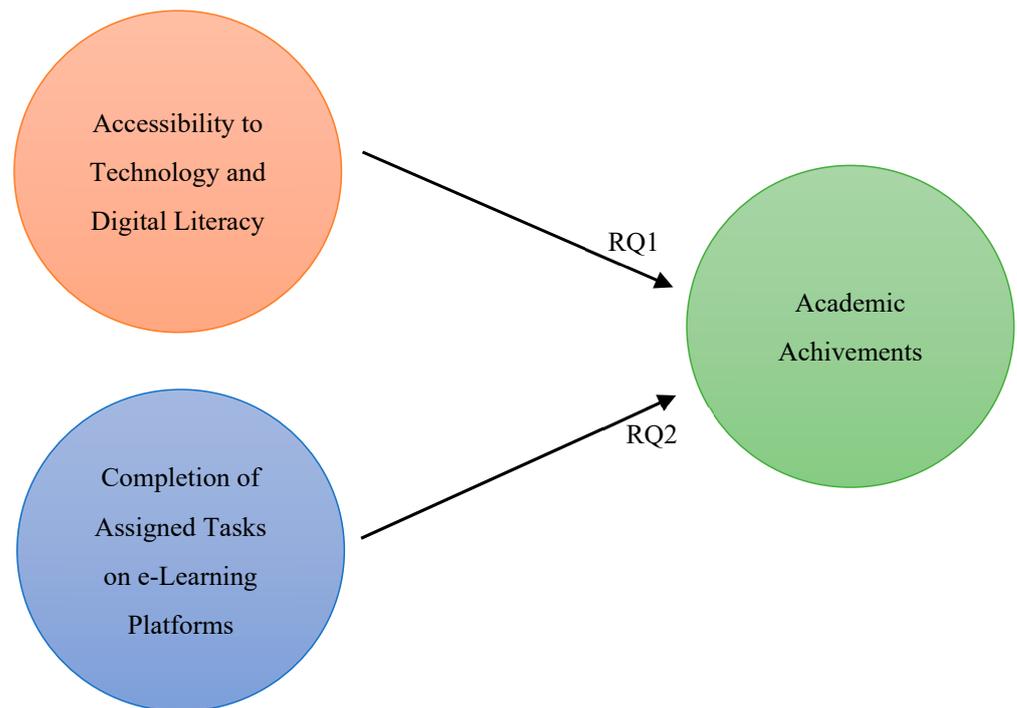


Figure 1. Conceptual framework of the study. Produced by the authors based on Kim et al. (2019) [37].

5. Research Methodology

5.1. Sample

In this study, university students are the primary focus due to the significant impact of technological advancements, such as e-Learning, on their academic achievements and the importance technology continues to have in their lives after graduation. The participants in this study were drawn from the University of Dhaka, the country's oldest public university, which has ranked number one for multiple consequent years with one of the highest total student enrolment numbers. All the participants are drawn from a single public university, which is due to the majority of the public universities having very similar characteristics and conditions. Moreover, most students at the University of Dhaka come from diverse socio-economic backgrounds and different parts of the country. Whereas other public universities usually have students concentrated in a single locality from where the university is located. Due to the similarity in characteristics and conditions of the public universities in the country, and also due to the higher number of enrolled students, it is considered that the sample from the University of Dhaka can ensure a proper representation of the population. An appropriate sample size of 275 participants was selected from a total population of 37,018 students [38]. A 98% confidence level and a margin of error of ± 7 percent were used to find the sample size using the following sample size formula for a finite population:

$$CI' = \hat{p} \pm z \times \sqrt{\left(\frac{\hat{p}(1-\hat{p})}{n'} \times \frac{N-n'}{N-1}\right)} \quad (1)$$

where z is the critical confidence level value, \hat{p} is the population proportion, n and n' are sample size, and N is the population size.

5.2. Research Design and Instruments

The selection of samples was made using both a non-probabilistic method, such as snowball sampling for the survey participants, and a probabilistic method, such as a random number method of simple random sampling for interviews. As most students currently enrolled in public universities have to use the e-Learning method in some capacity, the criteria for sample selection were primarily based on full-time enrollment in educational programs at the University of Dhaka. The sample composition comprised 54.5% male and 45.5% female; 64.7% of the participants are undergraduate; and the rest, 5.3%, are pursuing their postgraduate education, while their age range was 18 to 25. A total of 20 participants were randomly chosen for the In-Depth Interview (IDI) from the 275 sample size. The characteristics of the sample are shown in Table 1.

Table 1. Characteristics of the selected sample.

Characteristics		Frequency	Percentage
Gender	Male	150	54.5
	Female	125	45.5
Education level	Bachelors	178	64.7
	Masters	97	35.3

This study employs interpretivism philosophy, a mixed-method approach, abductive logical reasoning, and a cross-sectional time horizon. Abductive reasoning is used in this research to make the most straightforward and most likely conclusion based on the data collected. This study collected data between May and June of 2022. An online self-completion survey questionnaire and IDI was used to acquire research data. The survey includes a standardized 20-item questionnaire. Out of 20, 2 of the questions used a Likert scale for the quantitative approach, while 6 used binary yes-or-no questions for the qualitative approach. The questions from which data has been collected and the reliability score for the survey's quantitative items is listed in Table 2. Google Forms was the chosen online service for the survey. It was disseminated to the participants via social networking sites and academic emails. All survey respondents are from Bangladesh and are currently enrolled in a full-time educational program. The interview was completed online through Zoom utilizing a 6-item semi-structured standardized questionnaire. The reasons for conducting online interviews were for the convenience of the participants. The integrity of the research was maintained throughout the data collection process. The participants gave informed consent to partake and were aware of the study's purpose. Permission was sought before recording the conversation, and their details were kept confidential.

5.3. Data Analysis

Data collection and processing follow recommendations for mixed-method research by Palinkas et al. (2015) [39]. The statistical tools for social sciences, IBM SPSS version 25 and Microsoft Office Excel 2021, were used for analysis. Cronbach's alpha for quantitative items is 0.979, indicating that the questionnaire's reliability is excellent and acceptable. The qualitative data collected from interviews have been familiarized, coded, and themed following thematic analysis guidelines by Kiger and Varpio (2020) and using the qualitative data analysis software NVivo 12 [40].

Table 2. Survey questions were used for data analysis and reliability scores for quantitative items.

	Question	Type	Cronbach's Alpha
1	Do you have access to technological devices which can connect to the internet?	Qualitative	-
2	Do you have access to a fast internet connection?		
3	Do you have an uninterrupted internet connection?		
4	Have you been able to attend all the e-Learning activities offered by the university?		
5	Can you submit your academic work on an e-Learning platform for the assessment?		
6	Have you ever failed to submit your e-Learning based academic work on time due to a lack of access to technological devices or an internet connection?		
7	Despite the existing difficulties, do you think or have you gained any benefits from e-Learning, in terms of learning gain or better quality of education delivery?		
8	Do you consider yourself negatively impacted due to a lack of access to e-Learning and digital literacy?	Quantitative	0.979
9	Have your academic achievements been negatively impacted by technological advancement in education?		

6. Results

6.1. Results from the Survey

In the survey, students were asked whether they had 'access to technological devices which can connect to the internet', if they had 'access to a fast internet connection', and whether it was an 'uninterrupted internet connection'. The results of data analysis for the frequency of these questions are shown in Table 3. From the results, it can be seen that only 62.4% of students have access to technological devices that can connect to the Internet. In addition, 43.7% of the students have access to a fast internet connection. Surprisingly, only 26.5% of students have an uninterrupted internet connection.

Table 3. Students' access to technological devices and internet connection.

Question	Yes	No
Do you have access to technological devices which can connect to the internet?	52.4%	47.6%
Do you have access to a fast internet connection?	43.7%	57.3%
Do you have an uninterrupted internet connection?	26.5%	73.5%

The survey asked the students if they could 'attend all the e-Learning activities' offered by their university. Moreover, if they were required to submit their 'academic work on an e-Learning platform for assessment' and if they 'failed to submit their e-Learning based academic work on time due to lack of access to technological devices or internet connection'. From Table 4, it can be observed that 68.4% of the students could not attend all non-physical or virtual classes. Astoundingly, 94.5% of the students were required to submit their academic work in electronic format for assessment, and 59.2% could not submit it on time

due to a lack of access to technological devices or an internet connection. Moreover, the questions also asked if they “benefited from e-Learning” in any way, and 71.6% of them responded positively despite their existing predicaments.

Table 4. Students’ responses regarding questions about e-Learning activities and task submission.

Question	Yes	No
Have you been able to attend all the e-Learning activities offered by the university?	31.6%	68.4%
Can you submit your academic work on an e-Learning platform for the assessment?	94.5%	5.5%
Have you ever failed to submit your e-Learning based academic work on time due to a lack of access to technological devices or an internet connection?	59.2%	41.8%
Despite the existing difficulties, do you think or have gained any benefits from e-Learning, in terms of learning gain or better quality of education delivery?	71.6%	28.4%

The students were further asked whether they considered themselves to ‘lack digital literacy’ and if they considered their ‘academic achievements negatively impacted by e-Learning.’ These questions were asked on a 5-point scale. Where highly disagrees, neither agrees nor disagrees, agreed, and highly agree were associated with points 1, 2, 3, 4, and 5, respectively. From Table 5, it can be observed that most of the students agree that they lack digital literacy ($M = 4.03$; $SD = 1.13$) and are negatively affected by the advancement of technology in education ($M = 4.08$; $SD = 1.12$).

Table 5. Descriptive statistics of students’ response regarding digital literacy and impact on academic achievements.

Question	N	Mean	SD
Do you consider yourself negatively impacted due to a lack of access to e-Learning and digital literacy?	275	4.03	1.13
Have your academic achievements been negatively impacted by e-Learning in education?	275	4.08	1.12

Furthermore, Table 6 showcases that most of the students’ respondents highly agree with both questions. The first question had a response rate of 42.5% for the section, and the latter had a 48.1% response. Only a handful of students highly disagreed with both questions; the percent of answers for this section is 5.1% and 3.6%, respectively.

Table 6. Frequency distribution of students’ responses regarding digital literacy and impact on academic achievements.

Question	N	Likert Scale				
		1	2	3	4	5
Do you consider yourself negatively impacted due to a lack of access to e-Learning and digital literacy?	275	5.1%	8.0%	8.4%	36.0%	42.5%
Have your academic achievements been negatively impacted by technological advancement in education?	275	3.6%	8.3%	12.4%	27.6%	48.1%

Additionally, it can be seen from Table 7 and Figure 2 that the lack of access to technological devices and digital literacy and the negative impact on academic achievements due

to e-learning in education has a Spearman's rho value of 0.973, which can be considered a near-perfect association of ranks. This means the two factors are correlated.

Table 7. Correlation between lack of technological devices and digital literacy with academic achievements.

Question	Spearman's Rho
1. Do you consider yourself negatively impacted due to a lack of access to technological devices and digital literacy?	0.973 *
2. Have your academic achievements been negatively impacted by e-Learning in education?	

* $p < 0.01$.

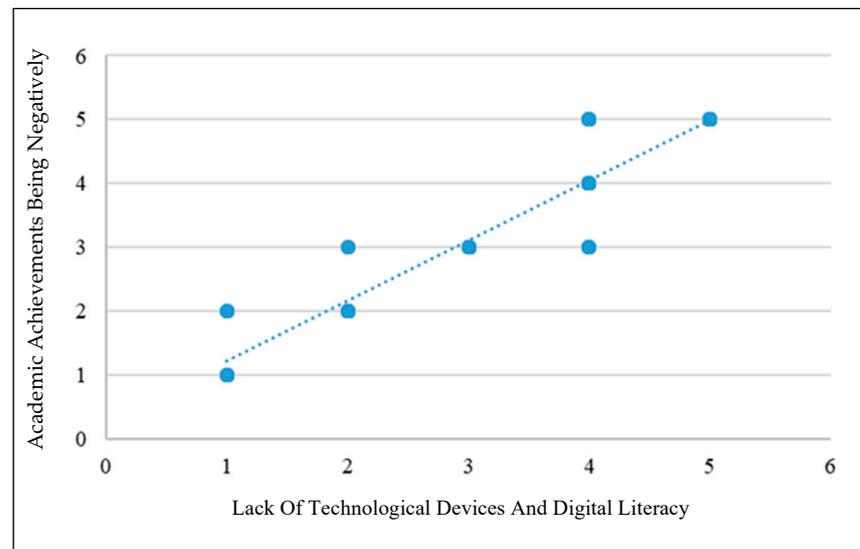


Figure 2. Correlation between lack of technological devices and digital literacy with academic achievements being negatively impacted due to e-Learning.

6.2. Results from the Interview

In the interview, the students were asked if they faced any barriers or difficulties securing positive academic achievements due to technological advancement in education. From the analysis of the interviews, it is found that 95% of the students agreed that technological progress in education has limited or negatively influenced their academic achievements.

Most students have uniformly indicated that the extensive usage of digital technology has become more prevalent in education. They also mentioned that more and more universities are utilizing e-Learning in multiple academic courses. Moreover, universities are now organizing various educational seminars and conferences online. Hence, most academic activities now demand students to have technological devices connected to the internet to fulfill most of their academic responsibilities. However, not all students can access technology devices due to financial limitations and other socio-economic considerations, contributing significantly to the digital divide.

Moreover, they have no financial support to purchase technological devices. All of which contribute negatively to their academic success. One of the students stated:

Since the start of the COVID-19 lockdown and sometimes even now, we have had multiple online classes and e-Learning activities ... However, I have neither a smartphone nor a laptop; hence I cannot join those. I miss attendance and miss out on that day's lessons ... Therefore, I cannot score well in many exams. (IDI 03)

Due to the lack of access to technological devices and an internet connection, these university students cannot attend all their academic activities through e-Learning correctly and miss out on multiple educational opportunities. Hence, as most interviewed students claimed, this affects their learning gains and academic achievement. Moreover, most students also said a lack of uninterrupted and fast internet connection available nationwide. Regarding the matter, one student added:

The availability of an uninterrupted and fast internet connection is another issue. Sometimes during many e-Learning or even before submitting an assignment, my internet becomes unavailable without any reason. As a result, I often fail to respond during attendance roll calls and miss out on e-Learning activity submission datelines . . . Mobile internet is even worse than broadband; it has more drops in network and slow speed, not to mention someplace it just fails to connect. (IDI 12)

Of the 20 students who were interviewed, 17 of them attributed their declining academic achievement to a lack of digital literacy, which arose due to a lack of access to technological devices and socio-economic factors. In addition, they reported that universities had included more effective use of e-Learning for completing academic activities and tasks. As a result of lacking the digital literacy necessary to achieve these academic tasks with technology devices, these students are falling behind their counterparts. One student opined:

Financially, I cannot afford a laptop right now. Hence, compared to many of my peers, I lack such technological gadgets and have poor digital literacy. These days, we have a lot of e-Learning activities, all of which need to be done on a laptop. However, I do not have them, so I have to ask someone to help me or go to one of those computer shops. These factors have severely affected my grades. (IDI 16)

The students reported that there had been an increased number of course-based tasks that needed to be completed through e-Learning, all of which require some level of digital literacy and owning a digital gadget. This lack of digital literacy contributes to a lesser quality submission of the assigned academic tasks, which results in lower grading for them.

However, the students were also asked one more question, their perspective regarding e-Learning and if such initiatives in universities will benefit them in learning and increasing the quality of education. Most students responded positively but mentioned that the benefits are significantly limited due to the existing predicaments. One of the interviewees expressed:

There is no denying the benefits of e-Learning is there. It's more interactive, there are more visual elements, and I can better understand many things through it. Most of my peers will agree with me when I talk about its benefits. But, similarly, most of my peers will also say they don't want to use e-Learning in universities right now, primarily because it has multiple difficulties. Hence, until those difficulties are removed, the actual benefits of e-Learning cannot be enjoyed by us. (IDI 20)

7. Discussion and Recommendations

The prevailing inequality and poverty, which have been plaguing Bangladesh despite its applaudable development, are well known. Moreover, these predicaments have resulted in a lack of social justice and a digital divide. Considering these factors, many previous studies and reports have stated the lack of access to technological devices, fast and stable internet connection, and persistent digital literacy in many parts of the country. Moreover, these issues have been cited to be due to the country's financial problems and other non-financial and infrastructural factors. These have created unfavorable conditions for students of all levels in Bangladesh. These issues have been widely reported by Kabir et al. (2021), Kabir et al. (2021), Saleh et al. (2022), and Progga et al. (2020), among many others [41–44]. However, the previous works have not covered or focused on how or to what extent these factors affect e-Learning for university students in Bangladesh. From the data collected by

this study, it can be seen that 47.6% of the students reported not having any technological devices for accessing e-Learning, which is nearly half of the total students.

Moreover, 57.3% reported not having any internet access. While the rest who did say having access to the internet again noted that 73.5% did not have a fast and stable internet connection. Furthermore, from the interviews, it was noticed that due to these existing factors, students had difficulties correctly accessing, utilizing, and learning from the e-Learning activities and tasks offered by their university. Hence, it could be said that to a great extent, university students' access to technological devices and the digital divide affects e-Learning in Bangladesh.

Similarly, it is also known through various previous studies that the lack of social justice and the digital divide have affected a student's academic achievements. Most of the earlier works have primarily focused on how a lack of social justice results in a lack of school choice. Hence, limiting the curriculum, quality of education, and accessibility to education by a student due to the socio-economic condition of the parents and other factors [45–47]. Moreover, few other works have also focused on how the digital divide has influenced students' academic achievements [48,49]. However, to what extent do university students consider technological advancement, such as e-Learning, adversely affects university students' academic achievements in Bangladesh is a topic that has never been focused on before by previous works. From this study's collected data, it can be seen that 68.4% of the students now have to use e-Learning activities and tasks; 94.5% have to submit tasks or complete activities through the e-Learning platforms for grading, which near to all the students who participated in this study; and 59.2% reported they have once failed to submit their tasks or complete the activity on time on the e-Learning platform.

Moreover, based on data analysis, it was found that there was a high positive correlation between a lack of technological devices and digital literacy, with academic achievements being negatively impacted due to e-Learning. Together with the numerical data, the interviews stated similar facts. Most students indicated that they found it challenging to complete the tasks or activities on the e-Learning platform with utmost diligence due to various predicaments, resulting in a bad grade or negative academic outcome for them. Therefore, for the second research question, it can also be said that, to a great extent, university students consider technological advancement, such as e-Learning, to adversely affects their academic achievements.

However, many previous works have stated e-Learning positively impacts students at various levels [50–52]. Paradoxically, the students who participated in the study also agreed to some extent regarding the benefits of e-Learning. However, they mentioned the barriers that have limited e-Learning benefits and sometimes cause drawbacks to students [53]. Based on these findings, it could be said that e-Learning is a doubled-edge sword for the academic achievements of university students in Bangladesh and other developing countries.

Recommendations

As the government of Bangladesh and other education-related offices are pushing for the digitalization and use of technology in education, the following suggestions and actions could help reduce the existing obstacles and mitigate the adverse effects of e-Learning:

First and foremost, the digital divide needs to be closed. This can be done by the government offering financial assistance through subsidies and public-private partnerships. The goal is to make digital devices and uninterrupted internet connections more accessible and affordable for college students.

Second, there needs to be an increase in the percentage of people who are literate in digital technology. This can be accomplished by fostering the growth of students' soft skills by providing training by educational institutions and other organizations.

Third, students must have access to affordable, uninterrupted, and fast internet connections. The government, internet service providers, and cellular service providers all

need to work together to make this a reality for students because it is the second most crucial factor in making effective use of technological advancements in education.

In conclusion, the existing educational curriculum must be modernized to guarantee the appropriate implementation of e-Learning in education. Teachers need the proper training to acquire the knowledge they need to maximize the benefits of these advancements. These recommendations will, one can only hope, ensure that the full potential of technological achievements in education and the academic achievements of university students is realized.

8. Limitations and Scope of Future Research

As time passes, a greater emphasis will be only on the positive effects that have been documented, while most of the unintended consequences have been swept under the rug. As a result, this paper aimed to illuminate the drawbacks associated with the rapid development of technology, such as e-Learning, in education. As a result, the knowledge gap has been addressed. However, one of the most significant shortcomings of this study is that it is unable to determine whether the impact that e-Learning in education has had on the academic achievement of university students varies according to other factors, such as the student's gender and the academic field or faculty in which they are currently enrolled at the university. As a result, the findings of this study will serve as a starting point, and further investigation will be required.

9. Conclusions

Amid the global health crisis, when it was physically challenging to carry out education delivery given the prevailing circumstances, technology emerged as essential for continuing education delivery. Although technology has been around for a considerable amount of time, its application, adaptation, and development have all accelerated dramatically during the period. e-learning, which was previously difficult to implement, is now within reach due to technological advancements. This is a significant change from the situation just a few years ago. Additionally, the development of technology was responsible for making the delivery of education and the dissemination of knowledge genuinely borderless. This was made possible by e-Learning. Students and academics worldwide were allowed to participate in webinars and world-class educational materials without the inconvenience of having to travel far from their homes. The development of e-Learning in education has made this outcome conceivable. It is impossible to dispute that e-Learning advances have positively impacted expanding educational opportunities and enhancing academic standards. In many regions of the world, a sizeable percentage of the population still regards access to technology and education as a luxury. The advancement of e-Learning in education has resulted in a more uneven distribution of educational opportunities and learning gains for many living in such locations.

Similarly, the application of e-Learning in educational settings in Bangladesh cannot reach its full potential. It is becoming a barrier to students' academic achievement for various reasons, including the existing lack of social justice and the digital divide. Still, there are also several other reasons. To make sure that educational institutions in Bangladesh can make the most of the opportunities presented by e-Learning, the government of Bangladesh and all of the critical stakeholders in the country need to take immediate action and remove these barriers quickly as they can.

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References

1. Ting, D.S.W.; Carin, L.; Dzau, V.; Wong, T.Y. Digital Technology and COVID-19. *Nat. Med.* **2020**, *26*, 459–461. [[CrossRef](#)] [[PubMed](#)]
2. Lamanauskas, V.; Makarskaitė-Petkevičienė, R. Distance Lectures in University Studies: Advantages, Disadvantages, Improvement. *Contemp. Educ. Technol.* **2021**, *13*, ep309. [[CrossRef](#)] [[PubMed](#)]
3. Abu Talib, M.; Bettayeb, A.M.; Omer, R.I. Analytical Study on the Impact of Technology in Higher Education during the Age of COVID-19: Systematic Literature Review. *Educ. Inf. Technol.* **2021**, *26*, 6719–6746. [[CrossRef](#)] [[PubMed](#)]
4. Todri, A.; Papajorgji, P.; Moskowitz, H.; Scalera, F. Perceptions Regarding Distance Learning in Higher Education, Smoothing the Transition. *Contemp. Educ. Technol.* **2020**, *13*, ep287. [[CrossRef](#)]
5. Alkhawaja, M.I.; Abd Halim, M.S.; Abumandil, M.S.S.; Al-Adwan, A.S. System Quality and Student's Acceptance of the E-Learning System: The Serial Mediation of Perceived Usefulness and Intention to Use. *Contemp. Educ. Technol.* **2022**, *14*, ep350. [[CrossRef](#)]
6. Alam, M.J.; Islam, S.R.B.; Ogawa, K. Discrete Primary Education Curriculum in Bangladesh: Implications of Gamification for Quality Education. In *Advances in Game-Based Learning*; Lane, C.-A., Ed.; IGI Global: Hershey, PA, USA, 2022; pp. 716–730. [[CrossRef](#)]
7. Islam, M.N.; Inan, T.T. Exploring the Fundamental Factors of Digital Inequality in Bangladesh. *SAGE Open* **2021**, *11*, 2158244021110214. [[CrossRef](#)]
8. Chowdhury, M.K.; Behak, F.B.P. Online Higher Education in Bangladesh during COVID-19: It Is Challenges and Prospects. *Utamax* **2022**, *4*, 15–28. [[CrossRef](#)]
9. Wekerle, C.; Daumiller, M.; Kollar, I. Using Digital Technology to Promote Higher Education Learning: The Importance of Different Learning Activities and Their Relations to Learning Outcomes. *J. Res. Technol. Educ.* **2022**, *54*, 1–17. [[CrossRef](#)]
10. Watts, G. COVID-19 and the Digital Divide in the UK. *Lancet Digit. Health* **2020**, *2*, e395–e396. [[CrossRef](#)]
11. University Grants Commission of Bangladesh. *Policy on Blended Learning for Bangladesh*; University Grants Commission of Bangladesh: Dhaka, Bangladesh, 2022.
12. Alam, G.M. Does Online Technology Provide Sustainable HE or Aggravate Diploma Disease? Evidence from Bangladesh—A Comparison of Conditions before and during COVID-19. *Technol. Soc.* **2021**, *66*, 101677. [[CrossRef](#)]
13. Farah, N.; Upadhyay, M.P. How Are School Dropouts Related to Household Characteristics? Analysis of Survey Data from Bangladesh. *Cogent Econ. Financ.* **2017**, *5*, 1268746. [[CrossRef](#)]
14. Milon, M.R.K.; Hossain, M.R.; Alam, M.R. Factors Influencing on Dropouts at Undergraduate Level in Private Universities of Bangladesh: A Case Study. *Australas. J. Bus. Soc. Sci. Inf. Technol.* **2018**, *4*, 177–188.
15. Dutta, S.; Smita, M.K. The Impact of COVID-19 Pandemic on Tertiary Education in Bangladesh: Students' Perspectives. *Open J. Soc. Sci.* **2020**, *8*, 53–68. [[CrossRef](#)]
16. Emon, E.K.H.; Alif, A.R.; Islam, M.S. Impact of COVID-19 on the Institutional Education System and Its Associated Students in Bangladesh. *Asian J. Educ. Soc. Stud.* **2020**, *11*, 34–46. [[CrossRef](#)]
17. Titumir, R.A.M. Poverty and Inequality in Bangladesh. In *Numbers and Narratives in Bangladesh's Economic Development*; Springer Singapore: Singapore, 2021; pp. 177–225; ISBN 9789811606571.
18. Alam, G.M.; Forhad, M.A.R. Clustering Secondary Education and the Focus on Science: Impacts on Higher Education and the Job Market in Bangladesh. *Comp. Educ. Rev.* **2021**, *65*, 310–331. [[CrossRef](#)]
19. Shahriar, S.H.B.; Arafat, S.; Sultana, N.; Akter, S.; Khan, M.M.R.; Nur, J.M.E.H.; Khan, S.I. The Transformation of Education during the Corona Pandemic: Exploring the Perspective of the Private University Students in Bangladesh. *Asian Assoc. Open Univ. J.* **2021**, *16*, 161–176. [[CrossRef](#)]

20. Aziz, A.; Islam, M.M.; Zakaria, M. COVID-19 Exposes Digital Divide, Social Stigma, and Information Crisis in Bangladesh. *Media Asia* **2020**, *47*, 144–151. [CrossRef]
21. Mathrani, A.; Sarvesh, T.; Umer, R. Digital Divide Framework: Online Learning in Developing Countries during the COVID-19 Lockdown. *Glob. Soc. Educ.* **2022**, *20*, 625–640. [CrossRef]
22. Saha, A.; Dutta, A.; Sifat, R.I. The Mental Impact of Digital Divide Due to COVID-19 Pandemic Induced Emergency Online Learning at Undergraduate Level: Evidence from Undergraduate Students from Dhaka City. *J. Affect. Disord.* **2021**, *294*, 170–179. [CrossRef]
23. Shohel, M.M.C.; Ashrafuzzaman, M.; Ahsan, M.S.; Mahmud, A.; Alam, A.S. Education in Emergencies, Inequities, and the Digital Divide: Strategies for Supporting Teachers and Students in Higher Education in Bangladesh. In *Advances in Mobile and Distance Learning*; Kyei-Blankson, L., Blankson, J., Ntuli, E., Eds.; IGI Global: Hershey, PA, USA, 2021; pp. 529–553; ISBN 978-1-79986-533-9.
24. Shrestha, S.; Haque, S.; Dawadi, S.; Giri, R.A. Preparations for and Practices of Online Education during the COVID-19 Pandemic: A Study of Bangladesh and Nepal. *Educ. Inf. Technol.* **2022**, *27*, 243–265. [CrossRef]
25. Al-Amin, M.; Zubayer, A.A.; Deb, B.; Hasan, M. Status of Tertiary Level Online Class in Bangladesh: Students' Response on Preparedness, Participation and Classroom Activities. *Heliyon* **2021**, *7*, e05943. [CrossRef]
26. Bashir, A.; Uddin, M.E.; Basu, B.L.; Khan, R. Transitioning to online education in english departments in bangladesh: Learner perspectives. *Indones. J. Appl. Linguist.* **2021**, *11*, 11–20. [CrossRef]
27. Chowdhury, F. Blended Learning: How to Flip the Classroom at HEIs in Bangladesh? *J. Res. Innov. Teach. Learn.* **2019**, *13*, 228–242. [CrossRef]
28. Lim, C.P.; Ra, S.; Chin, B.; Wang, T. Leveraging Information and Communication Technologies (ICT) to Enhance Education Equity, Quality, and Efficiency: Case Studies of Bangladesh and Nepal. *Educ. Media Int.* **2020**, *57*, 87–111. [CrossRef]
29. Shohel, M.M.C.; Babu, R.; Ashrafuzzaman, M.; Azim, F. *Redesigning Curriculum and Using Technologies During Emergency Remote Teaching and Learning in Higher Education in Bangladesh: In Advances in Mobile and Distance Learning*; Silva, S., Peres, P., Silva, C., Eds.; IGI Global: Hershey, PA, USA, 2022; pp. 196–215; ISBN 978-1-66846-071-9.
30. Saiful Islam, M.; Jahan, S.; Morshedul Hoque, M. Comparative Academic Achievement of the University Students in Bangladesh: An Empirical Investigation. *Int. J. Asian Soc. Sci.* **2020**, *10*, 381–395. [CrossRef]
31. Akter, S. Factors Affecting Academic Self-Efficacy and Its Impact on Perceived Academic Burnout among Students in Bangladesh. *Int. J. Entrep. Manag. Soc. Sci. Hum.* **2021**, *4*, 17–31. [CrossRef]
32. Alam, R.; Islam, R. Determinants of Academic Performance of the Students of Public Universities in Bangladesh. *Athens J. Educ.* **2022**, *9*, 641–654. [CrossRef]
33. Hoque, M.N.; Hannan, A.; Imran, S.; Alam, M.A.; Matubber, B.; Saha, S.M. Anxiety and Its Determinants among Undergraduate Students during E-Learning in Bangladesh Amid COVID-19. *J. Affect. Disord. Rep.* **2021**, *6*, 100241. [CrossRef]
34. Badiuzzaman, M.; Rafiquzzaman, M.; Rabby, M.I.I.; Rahman, M.M. The Latent Digital Divide and Its Drivers in E-Learning among Bangladeshi Students during the COVID-19 Pandemic. *Information* **2021**, *12*, 287. [CrossRef]
35. Oliver, M. Technological Determinism in Educational Technology Research: Some Alternative Ways of Thinking about the Relationship between Learning and Technology: Educational Technology and Determinism. *J. Comput. Assist. Learn.* **2011**, *27*, 373–384. [CrossRef]
36. Brandenburg, R.; Glasswell, K.; Jones, M.; Ryan, J. (Eds.) *Reflective Theory and Practice in Teacher Education*, 1st ed.; Self-Study of Teaching and Teacher Education Practices; Springer: Singapore, 2017; ISBN 978-981-10-3431-2.
37. Kim, H.J.; Hong, A.J.; Song, H.-D. The Roles of Academic Engagement and Digital Readiness in Students' Achievements in University e-Learning Environments. *Int. J. Educ. Technol. High. Educ.* **2019**, *16*, 21. [CrossRef]
38. University of Dhaka Home: Dhaka University. Available online: <https://www.du.ac.bd/#:~:text=risen%20to%20about-,37018,-and%201992%20respectively> (accessed on 16 April 2023).
39. Palinkas, L.A.; Horwitz, S.M.; Green, C.A.; Wisdom, J.P.; Duan, N.; Hoagwood, K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Adm. Policy Ment. Health Ment. Health Serv. Res.* **2015**, *42*, 533–544. [CrossRef]
40. Kiger, M.E.; Varpio, L. Thematic Analysis of Qualitative Data: AMEE Guide No. 131. *Med. Teach.* **2020**, *42*, 846–854. [CrossRef]
41. Kabir, H.; Nasrullah, S.M.; Hasan, M.K.; Ahmed, S.; Hawlader, M.D.H.; Mitra, D.K. Perceived E-Learning Stress as an Independent Predictor of e-Learning Readiness: Results from a Nationwide Survey in Bangladesh. *PLoS ONE* **2021**, *16*, e0259281. [CrossRef]
42. Kabir, H.; Hasan, M.K.; Mitra, D.K. E-Learning Readiness and Perceived Stress among the University Students of Bangladesh during COVID-19: A Countrywide Cross-Sectional Study. *Ann. Med.* **2021**, *53*, 2305–2314. [CrossRef]
43. Saleh, R.A.; Islam, M.T.; Nor, R.N.H. Factors Influencing University Students' E-Learning Adoption in Bangladesh During COVID-19: An Empirical Study with Machine Learning. In *Machine Intelligence and Data Science Applications*; Skala, V., Singh, T.P., Choudhury, T., Tomar, R., Abul Bashar, M., Eds.; Springer Nature: Singapore, 2022; Volume 132, pp. 695–706; ISBN 978-981-19234-6-3.
44. Progga, F.T.; Shahria, M.T.; Ahmed, N. The Effectiveness and Acceptance of Collaborative E-Learning in the Context of Bangladesh. In Proceedings of the 2020 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE), Takamatsu, Japan, 8–11 December 2020; pp. 554–558.
45. Mahmud, R. Learning in the Shadows: Parents' Investments, Family Burden, and Students' Workload in Dhaka, Bangladesh. *Asia Pac. Educ. Rev.* **2021**, *22*, 41–52. [CrossRef]

46. Uddin, E. Parental Lower-Income and Monetary Investment: Direct and Indirect Relation with Math Achievement during Third Grade in Bangladesh. *Qeios* **2022**. [[CrossRef](#)]
47. Alam, M.B.; Zhu, Z. Private Tutoring in Bangladesh: Evolution, Expansion, and Policy Responses. *Int. J. Comp. Educ. Dev.* **2022**, *24*, 20–36. [[CrossRef](#)]
48. Goudeau, S.; Sanrey, C.; Stanczak, A.; Manstead, A.; Darnon, C. Why Lockdown and Distance Learning during the COVID-19 Pandemic Are Likely to Increase the Social Class Achievement Gap. *Nat. Hum. Behav.* **2021**, *5*, 1273–1281. [[CrossRef](#)]
49. Ela, M.Z.; Shohel, T.A.; Shovo, T.-E.-A.; Khan, L.; Jahan, N.; Hossain, M.T.; Islam, M.N. Prolonged Lockdown and Academic Uncertainties in Bangladesh: A Qualitative Investigation during the COVID-19 Pandemic. *Heliyon* **2021**, *7*, e06263. [[CrossRef](#)]
50. Pérez-Juárez, M.Á.; González-Ortega, D.; Aguiar-Pérez, J.M. Digital Distractions from the Point of View of Higher Education Students. *Sustainability* **2023**, *15*, 6044. [[CrossRef](#)]
51. Alamri, M.M. A Model of E-Learning through Achievement Motivation and Academic Achievement among University Students in Saudi Arabia. *Sustainability* **2023**, *15*, 2264. [[CrossRef](#)]
52. Rahayu, F.S.; Nugroho, L.E.; Ferdiana, R.; Setyohadi, D.B. Motivation and Engagement of Final-Year Students When Using E-Learning: A Qualitative Study of Gamification in Pandemic Situation. *Sustainability* **2022**, *14*, 8906. [[CrossRef](#)]
53. Alam, M.J.; Ogawa, K.; Islam, S.R.B. Importance of Skills Development for Ensuring Graduates Employability: The Case of Bangladesh. *Soc. Sci.* **2022**, *11*, 360. [[CrossRef](#)]

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