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# Adoption of mobile learning among university students during and after the covid-19 pandemic in Bangladesh

**Nazneen R Noor ***
University of Asia Pacific, Bangladesh.
* Corresponding Author. E-mail: nazneen@uap-bd.edu

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ABSTRACT

Limited research has been done about the adoption of mobile learning among Bangladeshi university students, including those from public, private, and national universities. This study aims to unravel the nuances in students' attitudes influenced by personal and institutional factors, investigating the diverse higher education landscape post-return to traditional classrooms. The survey, encompassing demographic data and mobile technology utilization pre-, during, and post-COVID-19 from 453 Bangladeshi university students, is analyzed to measure their perceptions and attitudes regarding the efficacy of mobile learning. The result varies between public, private, and national university students. While many students have complimented and appreciated mobile learning for its ability to assist with financial struggles, the learning process, and grades, many of them have also reported a decline in the quality of their education during M-learning. Several students have expressed difficulty communicating and concentrating during online sessions. The study suggests that incorporating mobile learning technologies into traditional classroom settings could improve teaching and learning. Further research is needed to understand the impact of institutions on online education acceptance and student perceptions.



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## INTRODUCTION

The growing prevalence of urbanization and economic integration at a worldwide level has enabled enhanced global connectedness. The result of that connectivity has a significant impact on distance learning as well as using mobile technology in the education sector. Though COVID-19 makes this adoption of electronic learning a lot faster than planned.

The COVID-19 pandemic has had a significant detrimental effect on the education industry, resulting in the disruption of face-to-face instruction for around 1.6 billion students worldwide. Consequently, these students have been compelled to transition to an online learning environment. According to several studies, the closure of schools and educational institutions in 150 nations has impacted more than 80% of the global student population (Bozkurt et al., 2020; Sahu, 2020). In response to the COVID-19 pandemic, the Government of Bangladesh (GoB) implemented a "statewide lockdown" on March 23, 2020, to protect the general population (Sorder, 2020). Additionally, all educational institutions were ordered to close starting from March 17, 2020.

According to the UNICEF Survey on Children's Education in Bangladesh 2021, the period of closure persisted for 18 months, with the subsequent reopening of schools occurring on September 12, 2021 (BBS & UNICEF, 2022).

The COVID-19 pandemic has had a significant impact on the educational sector in Bangladesh, affecting around 36 million students and 100.000 instructors across elementary, secondary, and tertiary levels (Uddin, 2020). As a result of adhering to the social distancing measures advised by the World Health Organisation (WHO) to mitigate the spread of the virus, both students and instructors have been confined to their homes. On April 30, 2020, the government issued a request for public and private universities to maintain their educational programs through online instruction and initiate their academic operations in an online format (Barua, 2020).

Distance education has a rich history spanning over a century, encompassing a wealth of experience and established practices (Georgiev et al., 2004). Distance learning has been available in Bangladesh for around 30 years with Bangladesh Open University. The University Grants Commission of Bangladesh (UGC), the governing body responsible for overseeing higher education in the country, has imposed restrictions on the provision of distant or online courses in Bangladesh, limiting this privilege only to Bangladesh Open University (Chowdhury & Behak, 2022). These restrictions were in place before the onset of the pandemic.

As a result of the COVID-19 pandemic, educational institutions swiftly transitioned to online methods to maintain uninterrupted classroom instruction and prevent disruptions to the teaching-learning process. This involved the adoption of an e-learning environment, the establishment of standards and procedures, and the exploration of effective methods (Khan et al., 2022). Various platforms, such as Microsoft Office, Google Hangouts, Skype, Zoom, WhatsApp, and others, were introduced to both instructors and students (Rouf et al., 2022).

The acceptance or adoption of mobile learning has been uncovered by numerous pieces of evidence (Viberg et al., 2020). However, the impact of extensive use of m-learning in an online learning environment as the sole option during the pandemic time to complete the educational process as well as the transition from m-learning to traditional learning, has yet to be researched. The study aims to better understand how students perceive the variables that affect m-learning in higher education after getting back to a physical classroom. In Bangladesh, the delivery of tertiary education is characterized by distinct modules and study structures. Furthermore, the resources that are accessible to students are contingent upon a wide range of factors, including the educational institution that they attend, the circumstances of their family and finances, the location that they were in during the epidemic, and so on.

The Bangladesh government's decision to allow continuing education online, numerous higher education institutions in Bangladesh were compelled to initiate online operations, without a well-defined strategy in place. Due to this rash action, all parties had to deal with a wide range of issues. Despite possessing the technical competence to operate electronic devices, several students faced financial constraints preventing them from acquiring high-speed internet or these gadgets. This hindered their ability to adapt to the rapid transition of educational institutions to online systems (Hosen et al., 2022).

Despite the existence of numerous research gaps, the impact of mobile learning remains a significant area of study in the Bangladesh context. There is limited evidence available regarding the effects of implementing portable device-based learning as opposed to traditional face-to-face instruction on students in underdeveloped countries. One notable research gap pertains to the limited scope of inclusive investigations concerning students enrolled in diverse sorts of tertiary institutions (public university, private university, national university) that operate under distinct operational frameworks. Hence, this study aims to address this discrepancy and ascertain students' perceptions regarding the use of mobile learning.

The objective of this study is to enhance our comprehension of the heterogeneous student population in higher education institutions and investigate their perspectives regarding the elements that impact mobile learning once they transition back to traditional classroom environments. An analysis of the factors that affect the acceptance and use of mobile technologies in education is crucial, given the growing number of mobile internet users and

the potential benefits offered by mobile technologies (Khan et al., 2022). This research contributes to the improvement of learning through mobile devices, especially in State, Private, and National Universities.

## LITERATURE REVIEW

Given the global trend of distance education during the COVID-19 era, it is important to note that distance education has a long history and traditions. Its main characteristic is the distance and time separation between instructor and students. By nature, mobile learning (m-learning) is a form of existing digital learning (d-learning) and electronic learning (e-learning) (Basak et al., 2018).

Digital education is a sort of education where students use their home computers laptops or smartphones through the internet, staying away from their academic institutions (Anastasiades et al., 2010). M-learning is viewed as an extension of e-learning; however, its effectiveness might be dependent on the unique advantages and limits of mobile devices (Basak et al., 2018). However, the literature has several definitions of mobile learning. Some of them only think it can be internet- or wireless-based (Georgiev et al., 2004). Behera (2013) stated that modern technology, namely, the internet is no longer limited to the four walls of classrooms and it includes all sorts of electronically supported learning as well as teaching (Behera, 2013). According to Kacetl and Klímová "Mobile Learning occurs whenever learners have access to knowledge and resources everywhere and at any time utilizing portable apps to complete relevant tasks in an educational context (Kacetl & Klímová, 2019).

M-learning must be defined as the capacity to learn anywhere, at any time, without a constant physical connection to cable networks. The general development of new technology, which was not designed for academic objectives, may limit the wider application of its adoption in teaching due to potential technological constraints (Khan et al., 2022). Multiple studies indicate that mobile studies in higher education primarily employ instructional methodologies and lack transformative elements (Criollo et al., 2018). Recent research revealed that to properly utilize the instructional advantages provided by the use of mobile devices, more widespread and effective instructional enhancements are needed (Qashou, 2021).

With the appearance of new educational and technological advancements, m-learning would inevitably transform. By applying creative teaching methods, different aspects of educational resources can be easily understood (Kacetl & Klímová, 2019). Learning outcomes and educational strategies have been interdependent and mutually influential (Adejo et al., 2018). The full benefits of online learning are unavailable to students who cannot afford high-speed internet or technological gadgets (Murphy, 2020). A review suggested that as students' understanding differs between traditional classroom and online systems, the current curriculum of study and syllabus should be updated (Toquero, 2020).

Income inequality significantly affects the online learning environment (Beaunoyer et al., 2020). Students from middle-class families have experienced significant effects from the pandemic. (Rundle et al., 2020). The lockdown prevented tertiary students from earning through part-time jobs or other activities (Owusu et al., 2020). Due to the high price of laptops and desktop computers, mobile phones become the best tools for students to use for learning (Insorio, 2021). The most prevalent survey results were fatigue, stress, overwhelm, depression, and anxiety from more than 1300 students from high school, undergraduate, and postgraduate, apart from a poor e-learning system (Zuñiga et al., 2021). Tertiary students in Bangladesh, a lower middle-income Asian country, also had similar consequences.

Even though Bangladeshi universities and colleges produce a large number of graduates, there are few articles from Bangladesh about the impact of mobile learning on tertiary education including all groups including public, private, and college-based national universities. Most articles focused on single group perspective review rather than comprehensive scenarios.

The UGC annual report for 2021 reveals that Bangladesh has a total of 158 universities, consisting of 50 public universities and 108 private universities. At the tertiary level, there are a total of 4.44 million students enrolled in various programs at public universities and little more than

300 thousand students in private universities (UGC, 2021). The National University of Bangladesh (NUB), established in 1992, is an independent public university that operates as an umbrella institution. It oversees the academic operations of over 2,257 affiliated colleges and professional institutes. Based on the UGC Annual Report 2021, out of a total of 4,131,610 students enrolled in public universities, 2,934,712 are enrolled in different colleges and professional institutes affiliated with national universities, representing 71.04% of the total public university student population (UGC, 2021). This extensive network makes NUB one of the largest universities globally by student enrolment A large portion of National University students are from rural areas and lower and middle-income households with subpar academic achievement (Mukherjee et al., 2014). This extensive collection of samples is excluded from any investigation of the adoption of mobile learning at the tertiary level of education.

The issues considered about the adoption of mobile learning among university-level students are very confusing. In the context of Bangladesh, according to a survey conducted by Hosen et al., (2022) with 2,038 samples from Bangladeshi private and public universities, 55% of the students were unable to enroll in online classes due to inadequate internet connections, and 44.7% were unable to do so due to a lack of available equipment. Additionally, 87% of students say that online assessments are less helpful than assessments conducted in person, and 82% think that online classrooms are less effective than in-person ones (Hosen et al., 2022). Due to the obstacles, students encounter when taking online courses, including their lack of enthusiasm, conception of the subject, contact between the students and their lecturers, and a sense of isolation brought on by taking online courses, students continue to prefer face-to-face classroom instruction (Wallace, 2003).

Conversely, the above outcome contradicts other research findings. According to empirical research, smartphones are widely accepted by undergraduate students, particularly those studying business, as a tool for learning (Yağcı, 2018). A different study found that just 11.90% of students took online courses on a PC, the remainder of them use various mobile devices, 92.7% of which are Android-based (Chanda et al., 2022). According to the 2018 GSMA Mobile Economy Report, approximately half (51%) of the population in Bangladesh possesses a mobile phone. 38% of mobile phone consumers in Bangladesh owned a smart device before the pandemic. In May 2022, the ratio increased to 48% (Hasan, 2022). Approximately 82.02 million of the 87.79 million total internet consumers access the internet using mobile devices (Azad, 2022). In 2020, at the onset of the COVID-19 pandemic, internet connectivity was limited to just under 25% of the population in Bangladesh (Kameke, 2024).

One of the key considerations in mobile learning is the accessibility of internet connection. In January 2022, according to DataReportal, there were 52.58 million internet users in Bangladesh, which was 31.5 % of the whole population. According to a Kepios investigation, between 2021 and 2022, the number of internet users in Bangladesh rose by 5.5 million. These user statistics show that 114.5 million Bangladeshis, accounting for 68.5 % of the country's population, did not have access to the internet at the beginning of 2022 (Kemp, 2022). Another important apparatus required for online classes is internet speed. Bangladesh consistently ranks at the bottom of the Ookla Mobile Internet Speed Index. In July 2021 Bangladesh was at number 135 among 137 countries, though ranked 130th in the world for mobile speeds and 101st for fixed Broadband speeds in July 2022.

An effective and efficient online class depends on several criteria, but it is unclear which is most important (König et al., 2022). However, poor Internet connections, the cost of Internet connections and other technology gadgets, and students' lack of preparation are a few among many obstacles that have been faced by students (Rouf et al., 2022). Mobile learning is a helpful tool in this pandemic era, allowing students to learn outside of the classroom or engage in class from any location, strengthen their contact with their teachers, and bridge the long-term study gap. There is a lack of study on the viewpoints of diverse students, particularly those attending national universities, about mobile learning and its impact in Bangladesh since educational institutions have reopened and students have returned to traditional classrooms. This article will therefore aim to provide some insight on that particular topic.

## METHOD

### Research Design

This study utilizes a quantitative research approach to examine the views and attitudes of university students in Bangladesh regarding the effectiveness of mobile learning. Data on demographic information and mobile technology utilization were collected using a structured survey. The survey covered two different periods: pre-COVID-19 and during COVID-19 & post-COVID-19. Irrespective of gender, the survey was accessible to all university students for participation.

### Participants

The sample comprised 453 university students, from many institutions in Bangladesh, out of a total of over 500 individuals. The research included students from several universities in Bangladesh, encompassing both public and private institutions, as well as affiliated colleges and institutes associated with the National University of Bangladesh. The participants were chosen by a stratified random selection technique to guarantee a diverse representation across many demographic factors, such as age, gender, field of study, and year of study.

### Data Collection

The study was carried out using primary data. The acquisition of main data was accomplished via the use of a closed-ended structured data-collecting approach. The investigation makes use of a variety of methodological approaches, including survey methods and quantitative descriptive methodology. The survey questions utilized in this study were derived from a previous research study (Biswas et al., 2020; Hosen et al., 2022; Khan et al., 2022). Following the modification of the questionnaire components, it was distributed to experts on the appropriateness of its implementation for mobile phone adoption. The questionnaire underwent minor revisions before its finalization, as per the recommendations of the experts.

The questionnaire was sent to undergraduate and graduate university students using both physical means and online platforms (such as email, and social networking platforms), using a random sampling method. A considerable proportion of pupils participated in the online survey. The data is acquired after students return to a conventional classroom setting, without direct use of mobile learning technologies. The questionnaire was designed in both English as well as in the native language and included clear instructions to facilitate accurate and honest responses.

### Survey Instrument

The survey questionnaire contained three distinct sections:

#### *Demographic Data*

This section accumulates demographic data regarding students' age, gender, academic discipline, year of study, educational history, financial circumstances, and socio-economic background.

#### *Mobile Technology Utilization*

The subsequent section examines the utilization of mobile technology by individuals both before the pandemic and during and after the COVID-19 outbreak. This investigation encompasses the adaptability of mobile and technological devices for educational purposes, the frequency of online usage, the daily time allocation for mobile device usage, and the extent to which mobile devices are employed for educational activities.

#### *Perceptions and Attitudes*

This third section of the questionnaire measures students' opinions and attitudes regarding the utility of mobile learning technologies during the COVID-19 pandemic. The final segment of the survey assesses the perspectives and attitudes of students regarding the efficacy of mobile learning tools amidst the COVID-19 pandemic. The participants' responses to the third portion

were measured using a five-point Likert scale, with options ranging from 'Strongly Disagree' (1) to 'Strongly Agree' (5).

### Data Analysis

The gathered data was subjected to quantitative analysis using the SPSS software. Before conducting data analysis, the responses provided by the participants were subjected to coding and subsequent analysis to ensure reliability. The following steps were undertaken:

1. Descriptive statistics, used to summarize the demographic data and general trends in mobile technology utilization.
2. Comparative and inferential analysis, Compared the frequency and nature of mobile learning practices across the two phases (pre-, during, and post-COVID-19) of different groups as well as their financial conditions and summarize the learner's major area of perceptions on mobile learning. This comparative analysis is the major focus of this study included. Inferential statistics shows the ANOVA result.

The Cronbach Alpha reliability score of the questionnaire was determined to be 0.789, indicating a level of dependability that is considered acceptable.

## RESULTS AND DISCUSSION

### Results

This section includes demographic information about students and their background, technological know-how during & after the pandemic, and their impression of mobile learning. Table 1 represents the students' information regarding gender, educational institutions, and station during a pandemic, and Figures 1 and 2 illustrate the daily time allocation of university students to mobile phone usage before and after the pandemic, as well as the distinction between educational and non-educational objectives.

Table 1. Background Information

| No. | Classification | Category | Percentage |
|---|---|---|---|
| 1 | Gender | Female | 46.1% |
| | | Male | 53.9% |
| | | Total | 100% |
| 2 | Institutions type | Public University | 25.4% |
| | | Private University | 53.9% |
| | | National University | 20.8% |
| | | Total | 100% |
| 3 | Residence during pandemic | Inside Dhaka (Capital City) | 62.0% |
| | | Out of Dhaka City | 38.0% |
| | | Total | 100% |

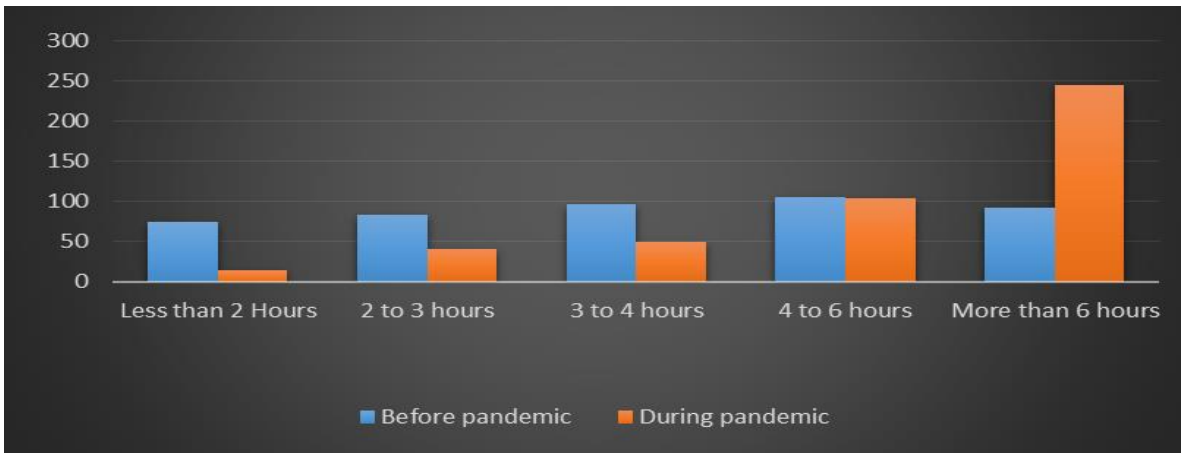


Figure 1. Everyday Mobil Device Uses

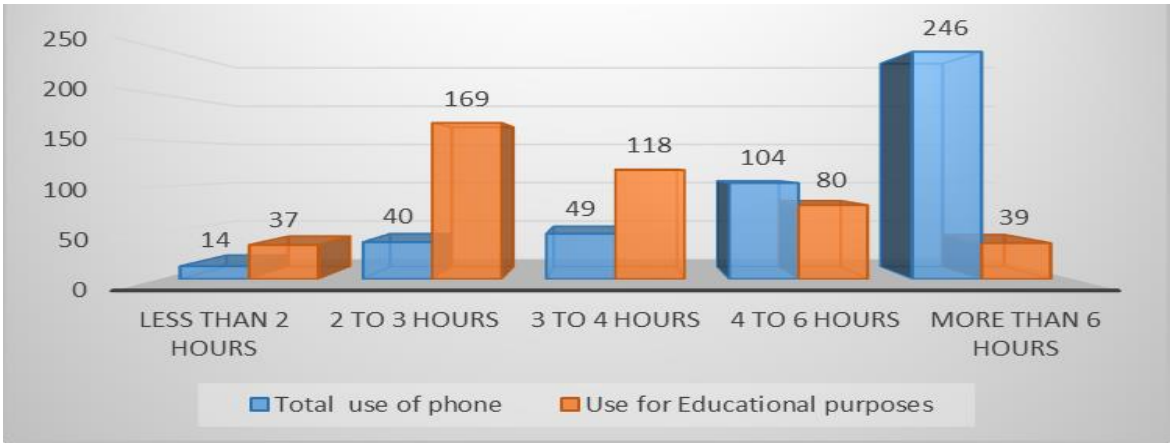


Figure 2. Purpose of Using Device During Pandemic

Amidst the pandemic, there was a surge in the utilization of mobile phones. Over 250 students reported using their phones for more than 6 hours each day, compared to less than 100 students before the epidemic. Additionally, the majority of students used their phones for less than 2 hours before the pandemic. Despite the COVID-19 pandemic, a mere 29.5% of students utilize their phones for educational purposes for a duration of 3-4 hours, while 37.5% of students use their phones for educational purposes for 2-3 hours. These findings closely align with the outcomes of several prior research (Biswas et al., 2020; Rouf et al., 2022).

Based on the technological data, it was evident that during the pandemic, only 165 students (36.42%) utilized more than one device, which was an increase from the pre-pandemic figure of 125 students (27.59%). During the epidemic, it was discovered that 38.7% of students purchased a new device specifically for educational purposes. Additionally, over 35% of students were required to share their educational equipment with another individual, which indicates the negative impact of quality education. This study provides further evidence for prior research on the influence of COVID-19 on Bangladeshi pupils (Hosen et al., 2022).

Among the entire student population, 287 individuals, or 63.4%, reported experiencing a substantial decrease in income as a result of the pandemic. Within this group of students. In the dataset categorized by institutional type, 60.9% of the students are from public universities, 63.1% are from private universities, and 67.0% are from national universities. Out of all the participants, 44.5% of students are currently facing challenges in restoring their income to pre-pandemic levels. Table 2 displays the percentage of students experiencing financial hardships, both overall and categorized by institution kinds.

Table 2. Financial Hardship During Covid-19

| No. | Institutions Type | Category Percentage | Did you Suffer Financial Difficulties due to the COVID-19 Pandemic? | | Total |
|---|---|---|---|---|---|
| | | | Yes | No | |
| 1 | Public University | % within the Institution's Sample | 60.9% | 39.1% | 100.0% |
| | | % within Total Population | 24.4% | 27.1% | 25.4% |
| 2 | Private University | % within the Institution's Sample | 63.1% | 36.9% | 100.0% |
| | | % within Total Population | 53.7% | 54.2% | 53.9% |
| 3 | National University | % within the Institution's Sample | 67.0% | 33.0% | 100.0% |
| | | % within Total Population | 22.0% | 18.7% | 20.8% |
| **Total** | | **Count** | **287** | **166** | **453** |
| | | **% of Total** | **63.4%** | **36.6%** | **100.0%** |

Smartphones enhance the learning process. Out of the students surveyed, 35% agreed and 28.4% expressed strong agreement with the ease of adopting mobile learning. This combined to a total of almost 60% of all students. That is also supported by the mean values of 1.46 and standard deviation of 1.56. However, just 20% of the participants agreed, and a mere 12.8% expressed a strong desire to pursue their education further through mobile learning platforms. These findings contradict some prior studies conducted in Bangladesh (Hosen et al., 2022; Rouf et al., 2022), nevertheless align with certain other national and international research (Biswas et al., 2020; Khan et al., 2022).

Approximately 57% (255 students) reported that mobile education had a positive impact on their financial situation during the Covid-19 pandemic. The mean value (M= 3.53) and standard deviation (SD 1.168) have likewise been similar. Over 64.4% of students expressed a preference for studying without any constraints on location or time. The student's response is characterized by a higher level of ambiguity regarding the dynamics of contact with professors and classmates. Nevertheless, 58.50% and 52.25% of students expressed that the lack of face-to-face connection and the absence of practical or lab lessons, respectively, diminish the effectiveness of their education. The present findings exhibit both congruities (Khan et al., 2021), and disparities with prior research on students' perceptions of mobile learning (Sarkar et al., 2021).

The learners exhibited various reactions to the challenges they encountered during mobile learning. The majority of students (65.56%) reported experiencing difficulties with network connectivity, while 58.30% encountered audio-visual issues during online lectures. These findings are also corroborated by research on the influence of the digital gap on e-education among Bangladeshi students (Alam et al., 2023; Badiuzzaman et al., 2021). A significant proportion of students (43.97%) acknowledged experiencing stress and anxiety when engaging in mobile learning. These conclusions have likewise been observed by the majority of earlier surveys (Emon et al., 2020; Hosen et al., 2022; Khan et al., 2021).

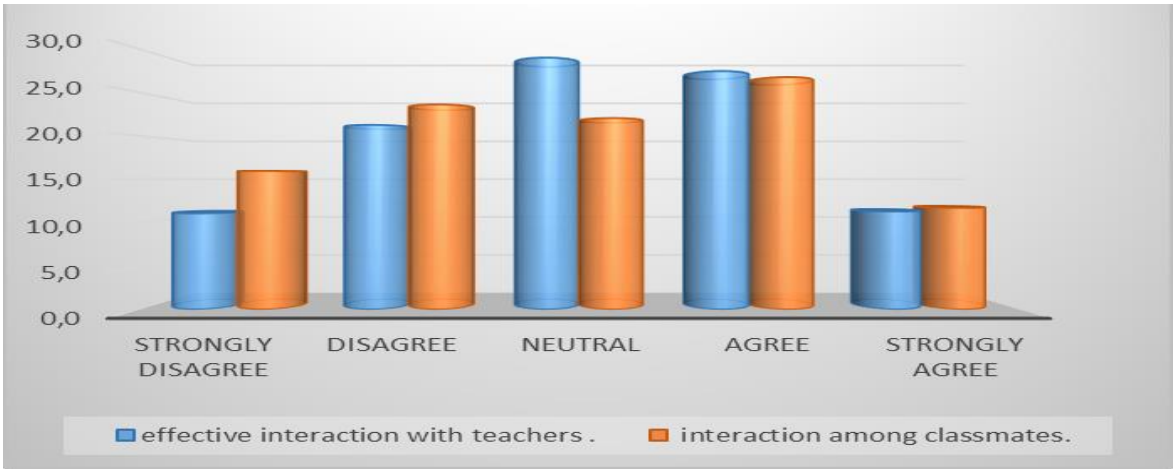


Figure 3. Effective Interaction During Online Learning

Figure 3 presents a feedback overview. The feedback regarding certain possibilities is impenetrable. Deriving a definitive conclusion from this study is remarkably challenging. 44.4% of students reported that m-learning facilitated their teamwork, while 43.8% of students expressed disagreement with the statement on the challenges of submitting reports or assignments. Conversely, 70% of students concur with the assertion that mobile learning enhances their technological proficiency, while 74% of students affirm that recorded classes were beneficial to them. 43.4% of the students reported that taking exams using mobile learning was easier for them, while 43.6% of the students agreed to varying degrees that mobile learning helps enhance their grades. Conversely, 12.8% of students hold an extremely negative opinion of the ease of mobile learning, while 14.4% strongly disagree with the notion that it improves their performance. Although a majority of 61.1% of students found the adoption of mobile learning to be easy. Conversely, 19.2% of individuals expressed disagreement with the remark to varying degrees, while 19.7% of students remained neutral on the matter. Nevertheless, transitioning from mobile

learning to traditional learning proved challenging for over 27.6% of students, as opposed to the 43.7% of students who found it straightforward. Only 11.9% of students express a strong desire to pursue their education using mobile learning. 45.00% of students exhibit a preference for the traditional mode of learning as opposed to mobile learning.

While many students have complimented and appreciated mobile learning for its ability to assist them improve their grades, a significant number of them have also reported a decline in the quality of their education during m-learning. Several students have expressed difficulty concentrating during online sessions, as they find themselves preoccupied with other tasks, consistent with prior research (Chanda et al., 2022). The following is the percentage of student perceptions regarding m-learning in learning which is presented in Table 3.

Table 3. Descriptive Statistics of the Learners' Perceptions of Mobile Learning

| No. | Category | SD | D | N | A | SA | Mean | Std. Deviation |
|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | | |
| 1 | Mobile Learning Provided Great Financial Assistance for Education During COVID-19. | 8.0 | 9.8 | 25.2 | 35.3 | 21.7 | 3.53 | 1.168 |
| 2 | Learning Through Mobile was Easy to Adopt | 7.5 | 11.7 | 19.7 | 35.8 | 25.2 | 3.60 | 1.198 |
| 3 | M-learning Support to Study without Obligation at any Place or Time. | 4.4 | 7.1 | 24.1 | 38.3 | 26.1 | 3.75 | 1.059 |
| 4 | Interaction with Teachers is More Effective Through M-learning. | 11.1 | 21.2 | 29.0 | 27.4 | 11.3 | 3.07 | 1.174 |
| 5 | M-Learning Increased the Interaction Among Classmates. | 16.0 | 23.6 | 22.0 | 26.7 | 11.7 | 2.95 | 1.269 |
| 6 | Exams on M-learning were Easier than the Traditional Exam. | 12.8 | 18.8 | 25.0 | 24.1 | 19.2 | 3.18 | 1.297 |
| 7 | M-learning Helped to Improve Grades in Exams. | 14.4 | 16.4 | 25.7 | 27.2 | 16.4 | 3.15 | 1.284 |
| 8 | M-Learning Simplified Accomplishing Teamwork/Group Project. | 10.3 | 23.3 | 22.4 | 31.8 | 12.3 | 3.13 | 1.201 |
| 9 | Absence of Face-to-Face Interaction Declined Usefulness of Learning. | 5.7 | 7.7 | 28.0 | 37.5 | 21.0 | 3.59 | 1.083 |
| 10 | Recorded Classes/Labs were Helpful for Study/Learning. | 4.3 | 5.8 | 15.9 | 26.7 | 47.3 | 4.07 | 1.117 |
| 11 | The absence of Practical Classes/ Lab Classes/Hands-on Experience Deteriorated the Quality of Learning. | 6.3 | 11.3 | 30.2 | 32.9 | 19.4 | 3.48 | 1.115 |
| 12 | I could not Concentrate on Online Classes. | 9.5 | 18.4 | 30.8 | 24.6 | 16.8 | 3.18 | 1.205 |
| 13 | Screen Size Hamper my Learning Efficiency. | 10.5 | 19.5 | 25.8 | 31.2 | 13.0 | 3.17 | 1.193 |
| 14 | I Faced Audio- Visual Problems During Class Time. | 6.3 | 14.1 | 21.3 | 37.4 | 20.9 | 3.52 | 1.153 |
| 15 | Slow Network Strength Hampers the Effectiveness of Study | 4.6 | 13.0 | 16.8 | 38.9 | 26.7 | 3.70 | 1.135 |
| 16 | Suffered from Mental Stress and Anxiety During M-learning Education. | 12.7 | 23.4 | 19.9 | 28.8 | 15.2 | 3.10 | 1.277 |
| 17 | It was Very Difficult to Submit and present a Report/Project/ Assignment Through the M-learning Process. | 19.0 | 24.6 | 22.8 | 21.5 | 12.2 | 2.82 | 1.294 |

| No. | Category | SD | D | N | A | SA | Mean | Std. Deviation |
|---|---|---|---|---|---|---|---|---|
| | | % | % | % | % | % | | |
| 18 | It was Very Easy for me to Shift from M-learning to Traditional Classroom Learning. | 10.2 | 17.4 | 28.7 | 30.0 | 13.7 | 3.19 | 1.182 |
| 19 | I would prefer to continue my Studies through Mobile rather than in the Traditional Way. | 22.3 | 22.7 | 25.6 | 17.4 | 11.9 | 2.77 | 1.301 |

Table 4. The ANOVA Test.

| No. | (I) Institutions Type | (J) Institutions Type | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower Bound | Upper Bound |
| 1 | Public University | Private University | .159 | .147 | .523 | -.19 | .50 |
| | | National University | .587* | .180 | .003 | .16 | 1.01 |
| 2 | Private University | Public University | -.159 | .147 | .523 | -.50 | .19 |
| | | National University | .427* | .158 | .019 | .06 | .80 |
| 3 | National University | Public University | -.587* | .180 | .003 | -1.01 | -.16 |
| | | Private University | -.427* | .158 | .019 | -.80 | -.06 |

*. The Mean Difference is Significant at the 0.05 Level.

A one-way between-groups analysis of variance (ANOVA) was employed in Table 4 to examine the preference for mobile learning compared to traditional classroom learning, taking into account the educational institutes (public, private, and national universities) of a total of 453 students. Mean test scores and standard deviations were from public universities (M = 2.97, SD = 1.223), private universities (M = 2.81, SD = 1.334), and national universities (M = 2.39, SD = 1.243).

There was a statistically significant difference at the $p < .05$ level in students' preference for the three groups F (2.441) = 5.679, p=.004. Despite reaching statistical significance, the actual difference in the mean score between the groups was quite small. The effect size, calculated using the eta square was 0.02, indicating lower impact. Post-hoc comparisons using the Tukey HSD test indicated that the mean score and standard deviation of National universities were significantly lower than public universities and private universities. There was no significant difference observed between private universities and public universities.

## Discussion

The survey results demonstrate that students possessed a robust comprehension of mobile learning, notwithstanding the likelihood of variations in their perspectives. Consequently, students were able to persist in their academic pursuits without any disruption, even throughout the period when the university was subjected to a lockdown. Just as previous analyses posed significant challenges in reaching a conclusive determination, this survey analysis similarly presents considerable difficulty in drawing clear conclusions. The objective of this study was to examine the degree to which students enrolled in diverse higher education institutions utilize different mobile phones for educational purposes.

The findings suggest that mobile learning is a highly effective technique for reducing the extended period between study sessions, despite the various challenges students encounter about their physical and mental well-being. Furthermore, mobile learning can enhance students' academic performance. This study also indicates that the vast majority of students have a preference for mixed learning over mobile learning and traditional learning. The result

from the survey posits that mobile learning, also referred to as M-learning, may prove advantageous in situations such as the COVID-19 pandemic. Similar to how earlier analyses presented substantial obstacles in the way of arriving at a definite conclusion, this survey analysis also poses a great amount of difficulty in terms of arriving at a conclusion that can be considered final.

The disparity between the findings of this research and prior studies can be largely attributed to the time of its implementation. Amid the height of the COVID-19 pandemic, a significant amount of research was carried out, marked by a sudden and widespread shift to online learning. The primary concerns expressed by participants revolved around the immediate challenges and disruptions they faced during this period, such as technological issues, limited engagement, and adapting to unfamiliar learning settings. These underlying concerns, which emphasized the adverse features of online learning due to its sudden and unstructured nature, probably influenced their comments.

Nevertheless, the latest study was carried out after the students' shift from virtual learning to conventional classroom environments. This scheduling will allow participants to make a fairer comparison between online and in-person learning. By employing both approaches, students may assess their experiences more discerningly, taking into account the benefits and drawbacks of each. The epidemic has brought about greater stability and reduced vulnerability in the educational environment, allowing for a more thorough and impartial assessment of online education.

Additionally, the ability to contrast the two situations following the pandemic offers distinct perspectives on the enduring consequences of online education. Students may now evaluate the effectiveness, level of involvement, and general satisfaction with online courses in comparison to traditional ones, without the added pressure and worry caused by the epidemic. This comparative method is expected to lead to a more thorough understanding of the educational experience by taking into account the changes and improvements in online teaching strategies that have been made over time. Hence, the discrepancies in survey answers highlight the importance of contextual elements on students' views and the relevance of timing in educational research.

## CONCLUSION

Amidst the COVID-19 pandemic, the primary objective of the research is to ascertain the viewpoints of university students in Bangladesh on the use of mobile phones exclusively for educational purposes. In the realm of education, digital networks offer the opportunity to improve the teaching and learning process. Therefore, lawmakers and educational establishments should consider the potential of incorporating mobile learning technologies into traditional classroom settings. This uncertainty may be attributed to many constraints. To address limitations in time and finances, the study sample comprises 456 persons, predominantly consisting of students from the institution situated in the metropolitan area of Dhaka. To gain a precise understanding of the situation, further investigation is required on students from various regions of Bangladesh, including diverse educational systems (public, private, and national universities as well as specialized education), their financial background, and other pertinent details. The use of mobile learning will have positive effects on the educational system for a specific duration, as evidenced by the study's findings and the currently available evidence. This study deepens our knowledge of the influence of institutions on the acceptance of online education in tertiary education in Bangladesh, while also guiding subsequent studies in this field. This comprehensive investigation also presents a compelling argument regarding the overall perception of university students toward mobile learning upon their return to the classroom. Academics and researchers will surely benefit from this study if they persist in conducting comparable research. The education sector should make a concerted effort to create a system that effectively bridges the gap between online and offline learning.

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