Pivotal Factors for Online Learning in Bangladesh During COVID-19 Emergency

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Abstract: This study aims to comprehensively identify key factors influencing the acceptance of online education in Bangladesh. A sample of 198 students with prior experience in online education was surveyed using a well-designed semi-structured questionnaire, and the reliability of questionnaire was ensured through a pilot survey. The study employed factor analysis, which revealed three critical factors impacting the acceptance of online education during the COVID-19 pandemic in Bangladesh: accessibility, satisfaction, and flexibility. The analysis found that accessibility and satisfaction, represented by five items each, explained 35.75% and 42.67% of the variance, respectively, highlighting their significance in shaping students' acceptance of online education. Moreover, the dimension of flexibility, encompassing course flexibility, mental health flexibility, and internet access, proved to be a crucial factor, explaining a substantial 57.09% of the total variance. The study provides valuable insights into the factors that enhance online learning experiences for students in Bangladesh. These findings offer guidance to educators and decision-makers seeking to improve the quality and accessibility of online learning opportunities. By understanding the factors that influence student experiences with online education, institutions can devise more effective strategies to promote student learning and engagement in the online environment.

Keywords: Online Education; Statistical Analysis; Accessibility; Satisfaction; Flexibility.

1. INTRODUCTION

The COVID-19 pandemic has significantly changed how education is carried out all across the world [1]. Due to the closing of schools, colleges, and universities, students are now compelled to complete their coursework online from home. Some pupils have embraced the new way of learning, while others are finding it difficult to adjust to this rapid change [21][22]. This study aims to examine the effects of online learning on college students, particularly with regard to their motivation, engagement, and overall academic achievement.

For students, especially those in higher education, the switch from traditional, in-person education to online education has presented a number of difficulties. Students are often more interested in practical, hands-on learning opportunities than merely theoretical knowledge in a university context [2]. Due to the shift to online learning, students must take part in virtual classes and online discussions instead of being able to attend lectures in person. Students may find staying focused and involved in virtual classes challenging, which presents a big obstacle.

However, the transition to online learning has made it more challenging for students to have access to the tools and software required for some assessments, like programming and hardware-based tests. Students, especially those majoring in STEM [3] fields, may suffer as a result since they may not have access to the resources, they need to complete their assignments and assessments.

Notwithstanding these difficulties, the move to online learning has given students numerous opportunities. With online education, students can attend classes and complete assignments at any time, from any location [4]. As they are no longer required to travel to classes, this can be especially advantageous for students with hectic schedules or who live in remote locations. Online classes also give students the option to review lectures and conversations, which is useful for individuals who might have missed some crucial information the first time.

The shift to online education has resulted in a mixed response from university students. While there are several challenges and limitations associated with online education, several opportunities and benefits can be leveraged.

2. BACKGROUND

The COVID-19 outbreak forced universities in Dhaka city to swiftly transition from traditional learning to online learning, posing numerous challenges for undergraduate students. Saha et al. [28] evaluated the reasons for psychological distress among undergraduate university students in Dhaka during the pandemic. Miah et al. [29] conducted a study to examine the influence of performance expectancy, effort expectancy, social influence, and facilitating conditions on the adoption of online learning among university students in Dhaka during the post-pandemic period. The research aimed to investigate the factors that motivate students in embracing online education after the COVID-19 pandemic's impact on traditional learning methods. Al Amin et al. [30] conducted a study aimed at exploring the factors that influence students' intention to continue using an e-Learning platform during the COVID-19 pandemic. The researchers incorporated two established models, the technology acceptance model, and the expectation-confirmation model, to investigate the impact of various determinants on students' continuance intention. The study's focus on contextual, psychological, and student support-related determinants provides a comprehensive approach to understanding students' decision-making processes regarding e-Learning platform usage during the pandemic. **Aim of the** research is to provide a deeper understanding of the factors which influence online education during emergencies.

A. *Accessibility of online education*

Students' satisfaction [5] with their learning experience was significantly influenced by the accessibility of online education. The accessibility of online learning [6] was crucial, especially for students with disabilities. Selwyn [7] suggested that the issues of digital literacy and student assistance are equally relevant to the accessibility of online education and go beyond the simple issue of physical access to technology.

B. *Satisfaction with online education*

Kim & Bonk [8] discovered a correlation between student satisfaction with online learning and the level of social interaction present. Happiness with online learning [9] was correlated with both the instructor's feedback and the perceived quality of the course material. The amount of interaction between students and instructors affected how satisfied students were with their online education [10].

C. *Flexibility with online education*

One of the main reasons why students favor online education is its flexibility [11]. Students' capacity to juggle work, family and other obligations with their studies was correlated with the flexibility [12] of online education. According to Zhu & Kaplan [13], students' capacity to customize their educational experience is correlated with the flexibility of online learning.

D. *Challenges in online education*

Chen et al. [14] found that the learner interface, learning community, and personalization influenced the intention to use of virtual learning environment among dentistry students, which in turn affected e-learner satisfaction. Clemes et al. [15] revealed that service quality and image positively impacted student satisfaction and future behavior intentions, but there was no statistical evidence of a link between price and satisfaction. Ben-David et al. [16] highlighted the need for more research to investigate the effect of different degrees of knowledge on the error-bound learning model. Tallent-Runnels et al. [17] examined the relationship between course design and learner outcomes in online education and found a need for more consistency in terminology and identifying emerging fields of study in the area of online education. Shrivastava et al. [18] conducted a questionnaire-based study of 533 dental students from across India to investigate the impact of online education on students. While students indicated that they preferred offline lectures over online lectures, 86.4 percent indicated that they preferred offline lectures. The findings of the study will be suggested the way to improve the quality of online education.

These studies provide valuable insights into the impact of online learning on student motivation, satisfaction, and performance (Fig. I). They highlight the potential of various methods, such as hybrid approaches, and meta-analytic reviews to enhance the online learning experience for students. However, more research is needed to fully understand the impact of online learning on different types of students, institutions, and courses. Further research is needed for deeper understanding factors for accepting online education during emergencies.
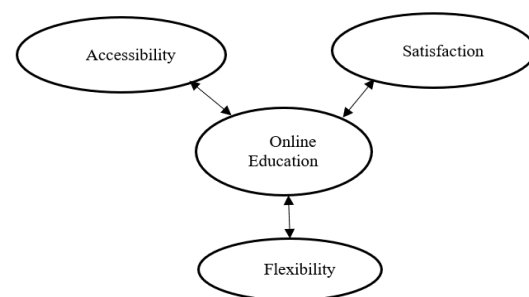
Fig. I. Conceptual Framework for Acceptance of Online Education.

3. METHODOLOGY

A. Data

The primary data for this study was collected from 198 tertiary level students of a private university in Bangladesh who had experience with online education during the COVID-19 pandemic. A semi-structured questionnaire was developed to measure the acceptance of online education in Bangladesh, and reliability was tested through a pilot survey. The questionnaire included questions on students' perceptions of the accessibility, satisfaction, and flexibility of online education.

B. Instrument

A semi-structured questionnaire based on observations was developed for the study [23-27]. Our questionnaire consists of 17 questions that are designed to measure the aforementioned factors. For accessibility, there are five questions regarding the accessibility of online education during COVID-19. Similarly, there are five questions for satisfaction. As for flexibility, there are seven questions divided into three parts: course flexibility, mental health flexibility, and internet connection flexibility. The items which were used to measure the accessibility, satisfactory and flexibility were validate [19] as the responses were recorded appropriately and as Cronbach's alpha were more than 0.5 which were enough to indicate reliability of the items (Table I) for explanatory research. As sample adequacy for the three factors were more than 0.6 and significance test from chi-square (Table I) which indicates that the sample size was enough and nature of data was eligible for performing factor analysis.

TABLE I.   RELIABILITY MEASUREMENT

Factor	Number of items	Cronbach's Alpha	Sampling Adequacy	Chi-Square with degree of freedom	P Value from Chi-Square
Accessibility	5	0.547	0.688	62.74 with df 10	<0.001
Satisfactory	5	0.529	0.662	60.70 with df 10	<0.001
Flexibility	7	0.503	0.650	79.67 with df 21	<0.001

C. Analytic Tools

In this study, two analytical tools were used to analyze the data collected from the survey: Factor Analysis and Pearson's correlation. Factor analysis was used to identify the underlying dimensions or factors related to online education. This analysis helps to reduce a large number of variables to a smaller set of factors that represent the key aspects of online education. Specifically, we used factor analysis to determine the dimension of factors that were related to online education.

Pearson's correlation was used to examine the relationship between the identified factors. This analysis helps to determine the degree of association between the different factors of online education. By using Pearson's correlation, we were able to identify the strength and direction of the relationship between the different factors related to online education.

4. RESULT AND DISCUSSION

During the COVID-19 epidemic, information was gathered from 198 students at several private universities in Bangladesh. Table II shows among the respondents, 65.66% of students were living in an urban region during the pandemic, and 47.98% of students were male. Science and engineering accounted for more than 44% of students, followed by business, health, and medical science. While 68% of students used both broadband and mobile data, more than 91% of students used mobile data.

TABLE II.   BACKGROUND CHARACTERISTICS OF THE RESPONDENT

Variable	Categories	Frequency	Percent
Gender	Male	95	47.98
	Female	103	52.02
Residence	Urban	130	65.66
	Rural	68	34.34
Internet user	Broadband user	154	77.77
	Mobile data user	181	91.41
	Both	137	69.19
Academic discipline	Business	42	21.21
	Arts and Humanities	31	15.66
	Science and Engineering	89	44.95
	Health Science	36	18.18

The 5 items of accessibility are considered as a factor because there is only one component that has an eigenvalue of more than 1. Table III shows this component is explaining more than 35% of the total variation of accessibility.

TABLE III.   VARIANCE EXPLAINED BY THE FACTOR ACCESSIBILITY OF ONLINE EDUCATION

Componen t	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Tota l	% of Variance	Cumulativ e %	Tota l	% of Variance	Cumulativ e %
1	1.78 7	35.74 5	35.745	1.78 7	35.74 5	35.745

*Extraction Method: Principal Component Analysis.

The 5 items of satisfaction are considered as a factor because there is only one component that has an eigenvalue of more than 1. Table IV shows this component is explaining more than 42% of the total variation in satisfaction.

TABLE IV.   VARIANCE EXPLAINED BY THE FACTOR SATISFACTION OF ONLINE EDUCATION

Comp onent	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Tota l	% of Variance	Cumulat ive %	Total	% of Variance	Cumulat ive %
1	1.51 8	42.671	42.671	1.518	42.671	42.671

*Extraction Method: Principal Component Analysis.

Table V shows the amount of variance in the data that is explained by each component (Flexibility in course, Flexibility in mental health and flexibility in internet) of the factor shown by the extraction sums of squared loadings. The first component accounts for 26.101% of the overall variance in the data with an extraction sum of squared loadings of 1.827. According to the cumulative% column, the first component accounts for 26.101% of the overall variance, with the second and third components each accounting for an additional 15.667% and 15.322%.

When the factor structure has been rotated to an ideal state, the rotation sums of squared loadings show how much variance in the data is explained by each factor item. The first three components of the factor "Flexibility of online education" have rotation sums of squared loadings that are lower than the corresponding extraction sums of squared loadings at 1.513, 1.274, and 1.210, respectively.

TABLE V.   VARIANCE EXPLAINED BY THE FACTOR FLEXIBILITY OF ONLINE EDUCATION

Comp onent	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumula tive %	Total	% of Variance	Cumula tive %
1	1.827	26.101	26.101	1.51 3	21.608	21.608
2	1.097	15.667	41.768	1.27 4	18.196	39.804
3	1.073	15.322	57.090	1.21 0	17.287	57.090

*Extraction Method: Principal Component Analysis.

The sampling adequacy is more than 0.6 for the three factors (accessibility, satisfactory, and flexibility) which indicate that sample size is multicount to perform factor analysis [20]. As the p value from chi-square is less than 0.01 for the factors. That is the items of the factors support to perform factor analysis.

Table VI shows that there is a strong positive correlation between Accessibility and Satisfactory (r = 0.830) which is significant at 1% level, the relationship is indicating that as Accessibility increases, so does the level of satisfaction with the course. There is also a positive moderate correlation between Accessibility and Course Flexibility (r = 0.562) which is significant at 1% level, meaning of the relationship is as Accessibility improves, so does the level of flexibility to online education. Furthermore, there is a weak positive correlation between Accessibility and Mental Health Flexibility (r = 0.201) which is significant at 1% level, it is indicating that as Accessibility increases, there is a slight improvement in the level of flexibility related to mental health concerns. Similarly, there is a weak positive correlation which is significant at 5% level between Course Flexibility and Mental Health Flexibility (r = 0.155), explaining that as the level of flexibility of an online course increase, so does the level of flexibility related to mental health concerns.
Finally, there is a moderate positive correlation between Course Flexibility and Internet Connection Flexibility (r = 0.276) which is significant at 1% level, indicating that as the level of flexibility in the course increases, there is a slight improvement in the level of flexibility related to internet access. These findings suggest that improving Accessibility and Flexibility in a course can have a positive impact on the level of satisfaction with the course and the flexibility related to mental health concerns and internet access. These findings could inform the design and delivery of online courses, with a focus on enhancing Accessibility and Flexibility to support students' well-being and academic success.

TABLE VI.   CORRELATION COEFFICIENTS

	Accessibility	Satisfactory	Flexibility_Course	Flexibility_MentalHealth	Flexibility_internet
Accessibility	1				
Satisfactory	.830**	1			
Flexibility_Course	.562**	.652**	1		
Flexibility_MentalHealth	.201**	.402**	.155*	1	
Flexibility_internet	.590**	.624**	.276**	.101	1

5. CONCLUSION

The COVID-19 pandemic has transformed education globally, pushing students into online learning. Objective of the study is to investigated the factors which are associated in acceptance of online education in Bangladesh during the Covid-19 pandemic. 198 students of different universities were interviewed through google form. The reliability and validity of the questionnaire was ensured using Cronbach's Alpha which was measured from pilot survey. Beside descriptive statistics; correlation and factor analysis were performed to achieve the objective.

Satisfactory on outcomes of online education has positive very strong relation (0.83) which is also significant with accessibility of online education. The three dimensions of flexibility – course work (0.562), mental stress (0.201) and internet (0.590) have also positive significant relation with accessibility of online education. Though the relation between flexibility of course work and internet with accessibility of online education were moderate, the relation with flexibility of mental stress was weak. That is, it is required to ensure satisfaction on outcome of online education, flexibility of course work, mental stress and internet access for accessibility of online education in any emergency situation.

This study was conducted through online self-administrative questionnaire which cannot control the interviewee. Because of budget limitation, this study used minimum required sample size, in future, a study can be conduct in large sample. Aim of the research is to provide a deeper understanding of the factors which influence online education during emergencies in Bangladesh perspective.

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