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Adoption of On-Campus Learning in Post-COVID-19 Pandemic: An Empirical Study on Private University Students of Bangladesh

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Abstract Due to the rapid extension and adoption of technology, online education has become popular to continue studying during the COVID-19 pandemic period in the absence of physical classes. Educational institutions have started on-campus academic activities after recovering from the pandemic. Students are required to make them adapt again to the conventional on-campus layout having a long time gap. This study mainly attempted to detect the factors affecting the adoption of on-campus learning in the post-COVID-19 pandemic. The study considered 235 students as a sample from six private universities in Dhaka and Chittagong cities. Five points Likert scale type questionnaire was used to collect the opinion of the respondents. The study used a sophisticated method of statistics – Factor Analysis (Principal Component Analysis) using varimax rotation to analyze the collected data. The study revealed four components- physical fitness and awareness, physical learning environment, active participation, and solvency and commitment. The study recommends that proper vaccination, regularity and active participation, support from the university and teachers, cooperation from classmates, and safety measures can assist students in adjusting to on-campus education.

Keywords: *on-campus learning, online learning, post-COVID-19 pandemic*

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1. Introduction

The world faced an intensive health crisis due to COVID-19, which extended its effect on the education system at every level. Education institutions remained closed for a long time during the pandemic and were forced to transfer to online learning from the traditional physical learning system. Online learning is a learning system using an electronic device like a computer or mobile phone, staying at different comfortable locations [1]. The use of technology in education changed our thinking about the method of education. Due to the progression of the latest technology, virtual education has emerged as an alternative or many supplements to traditional face-to-face teaching and learning during the COVID pandemic.

Online education is a relatively new concept in any developing country like Bangladesh. Higher education institutions, particularly private universities, introduced online education at the beginning stage of the pandemic and continued academic activities without session jams in Bangladesh [2]. Students made them adjusted and felt comfortable and easy with the new system. After almost two years in the virtual platform, students must adopt on-campus education again in the post-pandemic situation.

On-campus learning is a classroom set-up where everyone can communicate face-to-face and has different materials and furniture in the layout, including projection screens, boards, class monitors, chairs, tables, and other instruments. A physical classroom brings positivity and concentration to students regarding studies by creating an academic environment. The physical classroom ensures proper communication between students and teachers, and students can ask any question at any time and get it cleared in case of any doubt. The concepts become apparent, and students understand better when a face-to-face discussion is done. Students' concentration can be ensured in physical learning due to eye contact between teachers and students. Teachers are free to move the learners around, laying out the class in a way that will make the activities run smoothly and receive feedback quickly. The physical classroom facilitates students to learn behaviour, discipline, and mannerism alongside academic education. Students can improve leadership, communication, and interpersonal skill as physical classrooms have several options for students to engage and get involved in many activities. Students can also

participate in cultural, social, and extra and co-curricular activities in the on-campus study.

Students face challenges in coping with on-campus study as they are used to the online platform. Students are required to give up some facilities of virtual education that they enjoyed throughout the pandemic. The present study focuses on the acceptance and relevant factors of taking up on-campus education by Bangladeshi students after the COVID-19 pandemic.

2. Literature Review

In response to the Covid-19 pandemic, the education environment has been forced to change from the traditional classroom or blended teaching mode to the online learning teaching model [3]. Online learning has been carried out in many countries, with different online learning models being promoted and implemented.

On campus, learning is a traditional system where teachers deliver knowledge to students face-to-face without any third-party medium in a physical infrastructural layout [4]. The physical classroom facilitates face-to-face communication with teachers and classmates who can help conduct class work and assignments properly, concentrating on class and making studying more enjoyable [5]. It ensures a low chance of distraction in the classroom [6]. Bower [7] explained that online education requires students to invest in a range of equipment, including a computer, webcam, and stable internet connection, and go through a complicated process. In contrast, physical education is free of technological complications and related investment. Dyrud [8] mentioned that a traditional classroom ensures students' social interaction and physical and mental growth. They can participate in several extra-curricular and co-curricular activities to develop their creativity and leadership. Nagrale [6] believed this could be risky if students rely on distance education for a degree. Employers prefer on-campus degrees, rather than online courses, feel that distance education is still not a severe form of education.

As students have been used to the new virtual learning system almost for two years during the pandemic, some benefits of online education need to be sacrificed to adopt the traditional on-campus learning system again. Online or remote education implies that students are physically distant from the instructors and require a delivery method [9,10]. The interaction between students and teachers is mediated by technology, and the design of learning environments (e.g., space where learning occurs) can have considerable influence on learning outcomes [7,9,11]. Through distance learning, students can receive education from anywhere at any time and easily access course materials from international programs from different countries [6]. Students can use e-books and e-materials for study without purchasing expensive books in online education. A distance education degree fee (online or otherwise) may be much more affordable than a regular on-campus degree [5]. It helps the students improve their technological skills, share knowledge, and develop their learning capability [12]. Besides, distance education saves time and the cost of travelling to institutions, allows flexible schedules, and permits earning options while learning [13].

No study has been conducted to understand the factors of adopting on-campus study after the pandemic in Bangladesh. This study will fulfill the gap by addressing some relevant issues.

3.1. Rationale of the Study

Due to the COVID-19 outbreak, the world stands still in early 2020. All the organizations, along with educational institutions, also shut down worldwide. In Bangladesh, all educational institutions closed on 17th march 2020. Most universities carry on their academic activities through online platforms, which continued until the government declared to start on-campus education again. It was a great challenge to start on-campus education for tertiary-level institutions during the post-pandemic period. In this study, the researcher tries to determine the factors influencing students to cope with on-campus traditional academic activities in the post-COVID-19 pandemic.

3.2. Research Questions of the Study

What factors influence private university students to return to the on-campus learning system during the post-COVID-19 pandemic?

3.3. Objectives of the Study

Based on the above framework, the researchers try to explore the factors influencing the adoption of physical learning in the post-covid-19 pandemic. The objectives of the study are:

1. To explore the factors influencing the adoption of on-campus learning after online learning in the post-COVID pandemic in private universities in Bangladesh.
2. To provide suggestions to the policymakers to adopt the change in the learning system in the post-pandemic period.

4. Research Methods

4.1. Sample Design

A sampling frame is designed for the 3rd, 4th year and MBA students of business schools of private universities within the Dhaka and Chittagong division. The respondents are selected as per the convenience sampling technique.

4.2. Variables

The dependent variable in this study is 'the adoption of on-campus learning, and the independent variables are fifteen items (15). The variables are chosen based on the literature review and brainstorming sessions with the students of private universities in Bangladesh.

4.3. Data Collection

Primary data are the foundation of the investigation. Data were gathered using a Google form survey and a

questionnaire. Students at six private universities in Dhaka and Chittagong, Bangladesh, were issued the questionnaire form. Two hundred thirty-five students sent their responses. A five-point Likert scale questionnaire is designed to collect data, where values range from **(**Strongly Agreed =5, Agreed = 4, Neutral=3, Disagreed = 2, and Strongly Disagreed =1).

4.4. Survey Instrument

The instrument used in this research is a self-administered questionnaire; respondents understand the questions and complete the questionnaire based on his/her values. The questionnaire is contained fifteen- items along with demographic information.

4.5. Reliability of the Scale

Reliability is formed with an overall Cronbach's alpha that shows the solid or weak consistency of a set of items (variables) considered a hypothesis to measure the study concept. This study uses a reliability test to verify the consistencies of predetermined items/variables regarding the factors affecting the adoption of on-campus learning in the post-COVID-19 pandemic in private university students of Bangladesh. Cronbach's alpha is the most widely used reliability test method [14,15,16]. The value of Cronbach's alpha varies from 0 to 1, but values more than 0.6 is required to be reliable [16,17]. Cronbach's alpha is used in the current study to measure the scale's reliability. It is computed using the Statistical Package for Social Sciences (SPSS, version 23.0) software.

Table 1. Reliability of the scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.868	.875	15

Source: Author's own contribution, 2022.

The reliability value of the scale used in the present study is $\alpha = 0.868$. If we compare this reliability value of the scale with the standard alpha of 0.6 advocated by Cronbach [17,18,19], the scale of the present study is highly reliable for data analysis.

4.6. Validity of the Scale

For measuring the validity of the data, Pearson correlation was used, calculated using SPSS 23. The result indicates that all the items are valid at a 1% significant level.

Table 2. Validity of the Scale (Pearson Correlation, Sig. 2-tailed)

		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
Total	Pearson Correlation	.619**	.628**	.326**	.510**	.685**	.683**	.721**	.740**	.667**	.686**	.731**	.638**	.171**	.548**	.677**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.008	.000	.000
	N	235	235	235	235	235	235	235	235	235	235	235	235	235	235	235

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

4.6. Mode of Data Analysis

Factor Analysis (Principle Component Analysis-PCA) –A sophisticated method of statistics with the varimax rotation method is used in the study to obtain interpretable dimensions. Here, the researchers have followed the initial factor matrices to varimax rotation procedures to provide common orthogonal factors [20]. Finally, the on-campus learning determination dimensions in the post-COVID-19 pandemic are based on factor scores.

4.7. Identification of Variables of On-campus Learning in Post-COVID -19 Pandemic in Private Universities of Bangladesh:

The factors that influence the adoption of on-campus learning in the post-covid-19 pandemic in private universities of Bangladesh have been presented in the following table:

Table 3. List of variables of on-campus learning adoption post COVID-19

No. of variables	Name of Variables
V1	I am physically fit to attend a physical class.
V2	I was actively involved in an online class as well as active in a physical class now.
V3	My guardians' financial condition is stable to bear my tuition fees
V4	I was very much adaptive to online learning as well as physical learning.
V5	I am very much comfortable with physical classes rather than the virtual platform.
V6	I prefer physical exams to virtual moods of assessment.
V7	I prefer physical classes to virtual classes.
V8	My university provides full support to return to physical classes.
V9	My teachers provide adequate support to engage in physical learning.
V10	I am very much aware of maintaining social distance.
V11	I am aware of wearing a mask & hand sanitization.
V12	I am vaccinated my –self.
V13	I am in a panic about being attacked with COVID -19 new variant.
V14	My classmates are supportive of attaching me to the study.
V15	I am enjoying my group work (like presentations and assignments).

Source: Authors own scale development, 2022.

5. Findings and Analysis

5.1. Respondents' Profile

Table 4 shows the demographic information of respondents. Among 235 respondent, 23% is female, and 77% is male.2.6% of respondents are in the 18-20 age group,66% is in 21-23 years, and 31.5% is in the range of 24-26 years. All the respondents are from the fifth, sixth, seventh, and eighth semesters and MBA students, which indicate 11.5%, 13.2%, 28.9%, 12.8%, and 33.6%, respectively. Most respondents are single (93.6%), whereas only 6.4% are married.

Table 4. Demographic data of Respondents

Characteristics			Percentage (%)
1.	Gender	Female	23 %
		Male	77%
2.	Respondents' Age (in Years)	18-20	2.6%
		21-23	66%
		24-26	31.5%
3.	Semester	5th	11.5%
		6th	13.2%
		7th	28.9%
		8th	12.8%
		MBA	33.6%
4.	Result	2.50-2.75	16.2%
		2.76-3.00	19.1%
		3.01-3.25	22.1%
		3.26-3.50	21.7%
		3.51-3.75	13.2%
		3.76-4.00	7.7%
4.	Marital status	Married	6.4%
		Single	93.6%

5.2. Appropriateness of Data for Factor Analysis

Kaiser-Meyer-Olkin (KMO) is a helpful method to show the appropriateness of data for factor analysis. This method is a measure of sampling adequacy. The KMO statistics vary between 0 to1. Kasier [21] recommends that values greater than 0.5 are acceptable. Again, Bartlett's test of Sphericity [22] is another statistical test applied in the study to verify its appropriateness. This test should be significant, i.e., having a significance value of less than 0.5.

Table 5. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.869
Bartlett's Test of Sphericity	Approx. Chi-Square	1773.483
	df	105
	Sig.	.000

In this study, the value of KMO is 0.869, which is greater than 0.5, indicating that the sample taken to process the factor analysis is acceptable. Besides, the significance value is also less than 0.50. So, according to Bartlett's Test of Sphericity, the data is appropriate for the factor analysis.

5.3. Factor Analysis

The initial task of factor analysis is to extract and synthesize the overlapping parts of the original variables into factors. After testing the scale's reliability and the appropriateness of data, the researcher next carried out factor analysis to simplify diverse relationships among a set of observed variables. For this, the researcher used principal component analysis (PCA) followed by the varimax rotation. It is necessary to mention that factor loading greater than 0.3 is considered significant, 0.4 is considered more critical, and 0.5 or greater is considered very significant [15]. Again, Boyd [23] stated that Commonality is the sum of the square of its factors loading. Values for Communality show the percentage of the variance in the variables' responses that can be accounted for by the indicated causes. In the study, most factors that influence the adoption of on-campus learning are explained about 66.583% of the variance associated with most of the variables, and the factors fit the data quite well. In the study, a factor's eigenvalue is the sum of the squares of its factor loading, indicating how well each factor fits the data from all respondents on all variables.

5.4. Factors that Influence the Adoption of On-campus Learning in Post-COVID-19 Pandemic in Private Universities of Bangladesh

Table 6. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	5.923	39.488	39.488	5.923	39.488	39.488	3.855	25.698	25.698
2	1.965	13.098	52.585	1.965	13.098	52.585	3.251	21.676	47.375
3	1.081	7.204	59.790	1.081	7.204	59.790	1.532	10.211	57.586
4	1.019	6.793	66.583	1.019	6.793	66.583	1.349	8.997	66.583

When the fifteen variables (Table 6) are analyzed by the Principle Component Analysis (PCA) with varimax rotation, four components are extracted from the analysis with an Eigenvalue more significant than one. The analysis of the fifteen variables yields four factors, which explained 66.583% of the total variance. It implies that 33.417% of variations could be explained by other factors, which are not included in the model of analysis of this study. Component 1 explains 39.488% of the total variance, component 2 explains 13.098% of the total variance, and components 3 and 4 explain 7.204% and 6.793%, respectively.

Table 7. Rotated Component Matrix[a]

	Component			
	1	2	3	4
I am physically fit to attend a physical class	.636	.073	.215	.369
I was actively involved in an online class as well as active in physical classes now	.237	.314	.653	.324
My guardians' financial condition is stable to bear my tuition fees	.006	.124	-.102	.820
I was very much adaptive to online learning as well as physical learning	.092	.281	.446	.485
I am very much comfortable with physical classes rather than a virtual platform	.895	.180	-.009	-.012
I prefer physical exams to virtual moods of assessment	.837	.219	-.024	.022
I prefer physical class to virtual class	.901	.181	.038	.060
My university provides full support to return to a physical class	.808	.330	.075	-.023
My teachers provide adequate support to engage in physical learning	.399	.548	.071	.174
I am very much aware of maintaining social distance	.196	.759	.185	.134
I am aware of wearing a mask & hand sanitization	.228	.755	.283	.137
I have been vaccinated myself	.255	.487	.381	.213
I am in a panic about being attacked with COVID -19 new variant	-.123	.003	.760	-.261
My classmates are supportive to attached me in study	.033	.788	-.007	-.020
I am enjoying my group work (like presentations and assignments)	.293	.725	-.003	.125

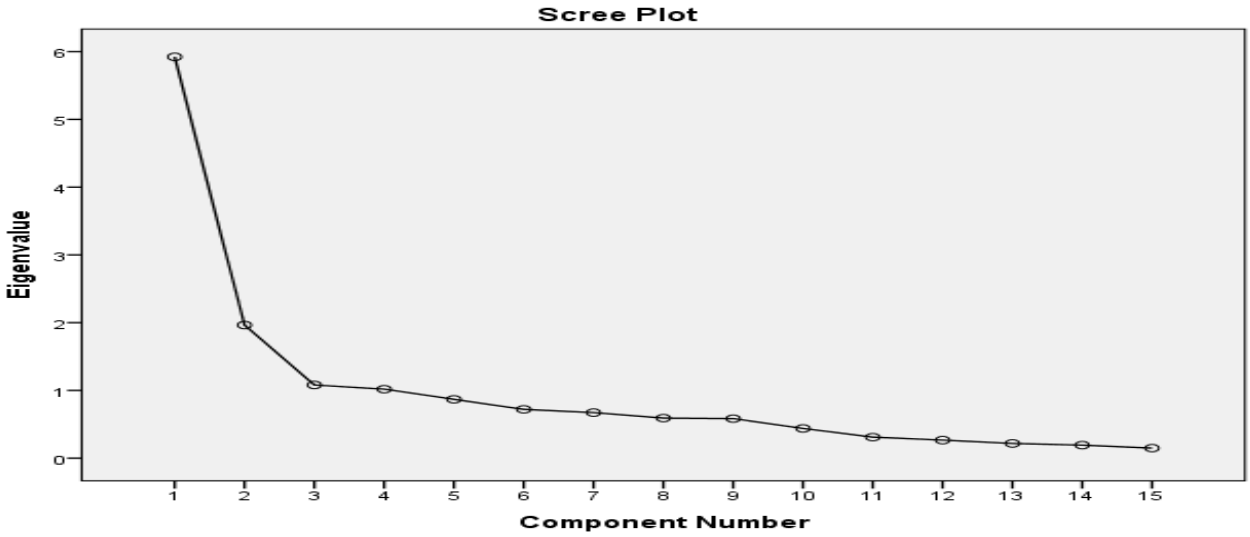
Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Each factor's items are grouped based on the rotated component matrix. Factor 1named physical fitness and awareness, include items 1, 5, 6, 7, and 8, which have the highest eigenvalue in component 1. Items 9, 10, 11, 12, 14, and 15 are grouped under component 2's "physical learning environment" factor. Factors 2 and 13 are combined under "active participation" in factor 3. Items 3 and 4, classified under component 4, are included in factor 4 (solvency and commitment). Table 8 indicates the grouping of items in each factor.

Table 8. Grouping of Items in Each Factor

Factors	Name of Factors	Items
1	Physical fitness and awareness	I am physically fit to attend physical class(V1) I am very much comfortable with physical class rather than a virtual platform(V5) I prefer physical exams to virtual moods of assessment(V6) I prefer physical class to virtual class(V7) My university provides full support to return to physical class(V8)
2	Physical learning environment	My teachers provide adequate support to engage in physical learning(V9) I am very much aware of maintaining social distance(V10) I am aware of wearing a mask & hand sanitization(V11) I am vaccinated my –self(V12) My classmates are supportive to attached me in the study(V14) I am enjoying my group work (like presentations and assignments)(V15)
3	Active participation	I was actively involved in an online class as well as active in physical class now(V2) I am in a panic about being attacked with COVID new -19 variant(V13)
4	Solvency and commitment	My guardians' financial condition is stable to bear my tuition fees(V3) I was very much adaptive to online learning as well as physical learning (V4)



The Scree plot indicates. Component 1 has the highest eigenvalue (5.923), which explains 39.488 of variance, and component four explains 6.793 of variance. In this study, four factors (components 1 to 4) are retained, and the eigenvalue is more than 1.00.

Table 9. Principle Component Analysis with Rotated Component Matrix and Communalities

Factors	Variables	Components				Communality
		1	2	3	4	
Physical fitness and awareness	V1	.636				0.592
	V5	.895				0.834
	V6	.837				0.750
	V7	.901				0.850
	V8	.808				0.769
Physical learning environment	V9		.548			0.495
	V10		.759			0.667
	V11		.755			0.720
	V12		.487			0.493
	V14		.788			0.622
	V15		.725			0.628
Active participation	V2			.653		0.687
	V13			.760		0.661
Solvency and commitment	V3				.820	0.697
	V4				.485	0.522
Eigenvalues		4.149	1.965	1.081	1.019	10.929
%of variance explained		39.488	13.098	7.204	6.793	66.583

The final four factors of on-campus learning adoption are named accordingly, and the result of the factor analysis is discussed as follows:

Factor 1: Physical fitness and awareness

Factor 1, named physical fitness and awareness, consists of five variables. The variables are-I am physically fit to attend physical class (V1), I am very much comfortable with physical class rather than the virtual platform(V5), I prefer physical exams to virtual moods of assessment(V6), I prefer physical class to virtual class (V7), My university provides full support to return physical class(V8). The loading of the variables are 0.636, 0.895, 0.837, 0.901, and 0.808 respectively. The Commonality of the variables is – 0.592, 0.834, 0.750, 0.850, and 0.769, respectively, which indicate a very significant relationship with the factor. The factor's eigenvalue is 4.149, which explains 39.488 % of the total variance. It indicates that physical fitness and awareness are essential for on-campus learning in the post-COVID-19 pandemic period, which is also emphasized by World Health Organization (WHO).

Factor 2: Physical learning environment

Factor 2, named physical learning environment, consists of six variables. The variables are- My teachers provide adequate support to engage in physical learning (V9), I am very much aware of maintaining social distance (V10), and I am aware of wearing masks & hand sanitization (V11). I have been vaccinated myself (V12), My classmates are supportive to attached me to a study (V14), and I am enjoying my group work (like presentations and assignments) (V15). The loading of the variables are- 0.548, 0.759, 0.755, 0.487, 0.788, and 0.725 respectively. The commonality of the variables is- 0.495, 0.667, 0.720, 0.493, 0.622, and 0.628 respectively. The factor's eigenvalue is 1.965, which explains 13.098 % of the total variance. This result indicates that the support of institutions for an on-campus learning environment also greatly impacts students to cope with the traditional learning system again in the post-pandemic period.

Factor 3: Active participation

Factor 3, named active participation, consists of two variables. The name of the variables is- I was actively involved in an online and physical class now(V2). I am in a panic about being attacked with COVID -19 new variant. The loading of the variables is- 0.653 and 0.760, and the Communality of the variables is 0.687 and 0.661. The factor's eigenvalue is 1.081, which explains 7.402% of the total variables.

Factor 4: Solvency and commitment

Factor 4, named solvency and commitment, consists of two variables. The variables are: My guardians' financial condition is stable to bear my tuition fees (V3), and I was very adaptive to online and physical learning (V4). The loading of the variables is 0.820 and 0.485. The Commonality of the variables is 0.697 and 0.522, indicating a significant relationship with the factor. The eigenvalue is 1.019, which explains 6.793 % of the total variance.

6. Conclusion

The study findings indicate that some essential factors, namely-physical fitness and awareness, physical learning environment, active participation, solvency, and commitment, influence the students to adopt on-campus learning in the new everyday life post-COVID-19 pandemic. The research findings are expected to contribute to policy-making in adopting changing educational institutions. There are some limitations to this research study. Firstly, the sample size (n=235) is small, which may limit the research findings. Secondly, the survey was conducted only on six private universities in Bangladesh. Future research may be conducted on a large sample size covering all private and public university students by considering other relevant issues related to on-campus learning factors after a pandemic.

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