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The impact on education of university students in COVID-19 pandemic period: A factor analysis

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Abstract

The educational sector of Bangladesh is severely affected due to the sudden outbreak of novel Corona virus (COVID-19). Bangladesh which is one of the densely populated countries has a significant improvement in the education sector along with the others in last some decades but this pandemic has played a serious setback to almost all the sectors of this small country. As all the educational institutes of Bangladesh are closed since 17th March 2020 till 30th June 14, 2021 and this may lead to many detrimental effects. To measure these, a survey was conducted and collected data was analyzed by SPSS Statistics v 25.0. This paper highlighted the mental stress, socio-economic crisis of the students that badly affected their

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education. It is observed in this study that around 80% of the students are going through mental stress particularly for internet facilities and financial crisis in pandemic period.

Subject Classification: Primary 93A30, Secondary 49K15.

Keywords: Covid-19, Principal component analysis, Pandemic.

1. Introduction

The new SARS-2 type novel Corona virus (nCovid-2) first case was detected on 8th March 2020 in Bangladesh (3 confirm cases) [1] after the outbreak in Wuhan of Hubei, China in 31st December 2019 [2]. The virus is contagious [3, 4, 5]. Man to man infection may occur through droplet [6, 7]. Keeping at least 1 meter distance from other can help to reduce the infection of this virus [8]. The chief of World Health Organization (WHO) declared the COVID-19 as a world pandemic on 11th March 2020[9]. After that a panic was created in the people around the world as well as in Bangladesh. The Government of Bangladesh (GOB) closed all educational institutes from 17th March 2020 [10] and this is continuing till March 29, 2021. The Government of Bangladesh enforced lockdown in different stage from 26th March 2020 to May 2020 [11]. On top of this, the prediction of Corona virus is getting so critical movement to consider [12-15]. As all the educational institutes are closed since 17th March 2020 after the outbreak of COVID-19, so undoubtedly the education sector is severely affected. The positivity rate is declining at the end of the last year. The Government was thinking to reopen the educational institutes gradually from May 2020. But again from the March 2020 the positivity rate of infection is becoming higher. The GOB and the others were worried after detection of the Indian variant B 1.167. Many educational institutes in Bangladesh especially tertiary level switch to the online learning system despite some reasonable barriers such as poor network, unaffordable/lack of devices, financial hardship etc. That raise another question of the effectiveness of this ongoing learning system. This paper is trying to find the problems on student's perspective that may help to resolve the impediments of ongoing online class.

2. Methodology

2.1 Data Collection

An online survey was conducted between March 2021 to mid April 2021, when the country was facing critical situation for the 2nd wave of the COVID-19 contamination. All the participants are from IUBAT-International University of Business Agriculture and Technology, one of

the largest and 1st private university in Bangladesh which is established in 1991. The questionnaire is given to the participants by linking the Google form where participants are requested to response confidentially and authentically. The link is passed to the mail address of the participant and reminder was given through Zoom, Google meet etc. The questionnaire contains three categories where in 1st part demographic variables, 2nd part five levels from strongly agree=1 to strongly disagree=5 according to the Likert's scale and in the 3rd part yes-no type answers are required to response. The questionnaire was set considering the variable financial and socio-economic condition of the sponsors and the participants, obstacles of the online classes etc. No incentive was given to the responders.

2.2 Sample size and Population

Sample size was 418 and 352 (84%) responders in the age group of 18 to 23 in this survey. The participants are the students of different undergraduate programs of this university.

2.3 Data Analysis

IBM SPSS Statistics V 25.0 was used for Principal Component Analysis (PCA), ANOVA and t-test. Due to the outbreak of COVID-19 our goal is to determine the effect in the education sector and hurdles in the ongoing alternative learning system on student's perspective. By PCA datasets are reduced which represent almost all the desired information. By PCA we compressed the data set and observe the number of components that are retain and therefore after extraction we have found six principal components. Since for PCA the Kaiser-Maier-Olkin (KMO) value is 0.818 in our research (KMO>0.5 is required) and significance of Bartlett's test of sphericity<0.01 (Here P=.000), so that our datasets are fitted to analyze. In addition the determinant value is 0.145 which indicates that multi co-linearity doesn't exist. Cronbach's alpha value is 0.819 which shows that data is consistent.

3. Result and Discussion

3.1 Demographic Analysis

In this research male and female participants are 72.2% and 27.8% respectively. It is also found that 84.2% responders are of the age group 18 to 23 years. Participants from rural and urban area are almost same.

We have found that a major portion (74.2%) of the students strongly agree that the tuition fee is a big problem, as their sponsor's/guardian's economical condition has worsened during the pandemic time. 10.5%

Table 1
Descriptive statistics

| | Mean | Std. Error | St. Deviation | Variance | Skewness | Kurtosis |
|--|------|------------|---------------|----------|----------|----------|
| Lack of network/ internet facilities creates a problem in concentrating on the online class (X_1). | 1.44 | .039 | .792 | .627 | 2.160 | 5.044 |
| Understanding the technical subjects by online system is more critical (X_2). | 1.63 | .041 | 0.826 | .682 | 1.494 | 2.475 |
| Online education makes a trouble in understanding the subject matter (X_3). | 2.03 | .051 | 1.043 | 1.088 | .851 | -.034 |
| Costing is higher in the online education system (X_4). | 2.17 | .057 | 1.151 | 1.324 | .784 | -.265 |
| Group study which is very effective is not possible in the online education system (X_5). | 1.98 | .055 | 1.127 | 1.270 | 1.049 | .169 |
| Online classes creates mental stress (X_6). | 1.82 | .052 | 1.055 | 1.114 | 1.307 | 1.012 |

students responded positively for the question whether they have missed any semester during the closure time for COVID-19.

Table 1 shows that variability of the two components X_1 and X_2 is less whereas the spread of the other four components X_3 , X_4 , X_5 , and X_6 is

higher. It is also found that student's online classes during the prolonged pandemic period seriously affected for internet facilities (mean value 1.44 ± 0.39).

3.2 Factor Analysis

Factor analysis is a technique of finding the small number of factors by reducing the large numbers of variables into smaller size variables. This technique extracts the highest number of common variance from all the existing variables and having a common score. Since these factors have common variance, so this common score can be used for next analysis. Principal component analysis is one of the most used methods for that analysis. PCA is one of the oldest and well known multivariate data analyzing techniques of collecting the important information by reducing the variables.

Table 2 shows that Cronbach's alpha value is in between 0.767 and 0.811(>0.70) which indicates that during the pandemic period students are facing trouble in online classes in understanding, affording tuition fees that ultimately creates mental stress to them.

Table 2
Item-total correlation

| Principal component | Corrected -Item- Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---------------------------------------|-------------------------------------|
| Lack of network/internet facilities creates a problem in concentrating on the online class (X_1). | .478 | .811 |
| Understanding the technical subjects by online system is more critical (X_2). | .690 | .773 |
| Online education makes a trouble in understanding the subject matter (X_3). | .683 | .767 |
| Costing is higher in the online education system (X_4). | .520 | .807 |
| Group study which is very effective is not possible in the online education system (X_5). | .588 | .790 |
| Online class creates mental stress (X_6). | .590 | .788 |

Table 3
Variance table (Total variance explained for a principle component analysis)

| Factor | Initial Eigen values | | | Extraction Sums of Squared Loadings | | |
|--------|----------------------|------------|--------------|-------------------------------------|------------|--------------|
| | Total | % Variance | Cumulative % | Total | % Variance | Cumulative % |
| 1 | 3.223 | 53.720 | 53.720 | 2.706 | 45.101 | 45.101 |
| 2 | .783 | 13.050 | 66.770 | | | |
| 3 | .619 | 10.319 | 77.089 | | | |
| 4 | .568 | 9.474 | 86.563 | | | |
| 5 | .483 | 8.052 | 94.615 | | | |
| 6 | .323 | | | | | |

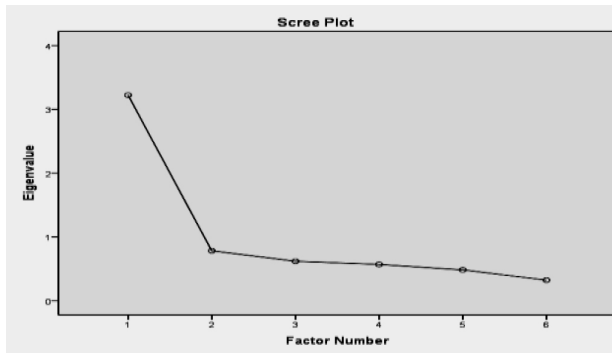


Figure 1
Eigen value and principle component analysis

It is observed from the scree plot (Figure 1) that only one component whose *eigen value* is greater than 1 need to be recognized to the study. From the Table 4 it is found that the initial eigen value of this component is 3.223 and it explained 53.720% of the total variation among the perception indicators.

Table 4 shows, that significant positive relationship between X_1 and X_3 and X_1 and X_4 . All other correlation is positive moderate. Moderate correlation exists between the insufficient network (X_1) with the mental health and the group study (X_1 vs. X_5, X_6) that means due to lack of internet facilities student's can't discuss with each other which creates a mental

Table 4
Correlation Matrix

| | X_1 | X_2 | X_3 | X_4 | X_5 | X_6 |
|-------|-------|-------|-------|-------|-------|-------|
| X_1 | 1.000 | .431 | .282 | .290 | .381 | .466 |
| X_2 | | 1.000 | .436 | .513 | .468 | .660 |
| X_3 | | | 1.000 | .443 | .406 | .371 |
| X_4 | | | | 1.000 | .422 | .497 |
| X_5 | | | | | 1.000 | .529 |
| X_6 | | | | | | 1.000 |

stress. X_2 has significant moderate positive correlation with other issues (X_2 vs. X_3 , X_4 , X_5 , X_6), the correlation value is between .436 to .66. X_3 has significant moderate correlation with X_4 , X_5 , X_6 (X_3 vs. X_4 , X_5 , X_6) where correlation value between the range .371 to .443. Also moderate significant positive correlation exists between X_4 with components X_5 and X_6 . Significant positive moderate correlation between X_5 and X_6 ($r = .529$, $p < .05$) which means as the students are out of the campus they are unable to share their problems with others which creates a mental stress to them. All these results signify that as the students are staying in home and missing the face to face class due to COVID-19.

4. Conclusion

The closure of the all educational institutes for more than fifteen months compels students to go for online learning system suddenly which is absolutely a new system in our country. The outbreak of novel Corona virus (nCOVID-19) pushes them to switch for unfamiliar system without any development in this sector which creates a serious problem to their learning process. Students had to go through this system for which they were not prepared at all. It is found that more than 46% students couldn't do the online class comfortably for lack of suitable devices. It is also found that internet facility is a severe problem which is a great obstacle in joining the online learning system. In addition high cost of internet data is another barrier. The earning sources (either their sponsor or self-reliant students) are badly affected during the pandemic period. Our finding shows that nearly 56% students strongly agree that educational sector is one of the most affected sectors. All these things create a mental stress to the students. Without addressing these matters, the ongoing online education system is quite impossible to be fruitful.

References

- [1] IEDCR-Institute of Epidemiology, Disease Control and Research, Covid-19 Status Bangladesh, (2020). https://iedcr.gov.bd/?fbclid=IwAR2hg_O6cQvLPCrY-jrWYW4Lui9CImX3s5cfTDXHe093QfU1XzAqB15AwWQ10.
- [2] WHO-World Health Organization, Archived: WHO Timeline - COVID-19, <https://www.who.int/news/item/27-04-2020-who-timeline---covid-19>.
- [3] Wu, Yi-Chia; Chen, Ching-Sunga; Chan, Yu-Jiuna, b, c, The outbreak of COVID-19: An overview, *Journal of the Chinese Medical Association*, volume 83 - Issue 3, pp. 217-220, (2020).
- [4] Adarsh Bhimraj, Rebecca L Morgan, Amy Hirsch Shumaker, Valery Lavergne, Lindsey Baden, Vincent Chi-Chung Cheng, Kathryn M Edwards, Rajesh Gandhi, William J Muller, John C O'Horo, ShmuelShoham, M Hassan Murad, Reem A Mustafa, Shahnaz Sultan, YngveFalck-Ytter, Infectious Diseases Society of America Guidelines on the Treatment and Management of Patients With Coronavirus Disease 2019 (COVID-19), *Clinical Infectious Diseases*, ciaa478, (2020).
- [5] Kimberly E Hanson, Angela M Caliendo, Cesar A Arias, Janet A Englund, Mark J Lee, Mark Loeb, Robin Patel, Abdallah El Alayli, Mohamad A Kalot, YngveFalck-Ytter, Valery Lavergne, Rebecca L Morgan, M Hassan Murad, Shahnaz Sultan, AdarshBhimraj, Reem A Mustafa, Infectious Diseases Society of America Guidelines on the Diagnosis of Coronavirus Disease 2019, *Clinical Infectious Diseases*, ciaa760, (2020).
- [6] Wu, Yi-Chia; Chen, Ching-Sunga; Chan, Yu-Jiuna,b,c,* The outbreak of COVID-19: An overview, *Journal of the Chinese Medical Association*, Volume 83 - Issue 3 – pp. 217-220, (2020).
- [7] Junwei Ding, Chuck Wah Yu, Shi-Jie Cao, HVAC systems for environmental control to minimize the COVID-19 infection, *Indoor and Built Environment*, Volume 29, Issue 9, pp. 1195-1201, (2020).
- [8] WHO-World Health Organization, Coronavirus disease (COVID-19) advice for the public, <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>.
- [9] WHO-World Health Organization, WHO Director-General's opening remarks at the media briefing on COVID-19, (2020). <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.

- [10] <https://unb.com.bd/category/bangladesh/all-educational-institutions-to-remain-closed-till-march-31-dipu-moni/47157>
- [11] Shammi M, Bodrud-doza M, Reza A and Rahman MM, Title: Psychosocial, and socio-economic crisis in Bangladesh due to COVID-19 pandemic: A perception-based assessment, *Frontiers in Public Health*, volume 8, article 341, pp. 1-17, (2020).
- [12] V. Singh, R. C. Poonia, S. Kumar, P. Das, P. Agarwal, V. Bhatnagar & L. Raja, Prediction of COVID-19 corona virus pandemic based on time series data using support vector machine, *Journal of Discrete Mathematical Sciences and Cryptography*, Vol. 23, Issue 8, pp. 1583-1597, (2020).
- [13] O. M. Ogunmiloro, On the mathematical modeling of COVID-19 pandemic disease with some non-pharmaceutical interventions: Nigerian case study, *Journal of Interdisciplinary Mathematics*, vol. 25, issue 4, pp. 1071-1092, (2022).
- [14] F. Movahedi, Controlling infectious disease outbreak in a community using a new technique, *Journal of Interdisciplinary Mathematics*, vol. 25, issue 2, pp. 351-372, (2022).
- [15] J. D. Beegum, D. Sasi, Novel implementation of "Filtered-Reconstruction ICA" enabled wheeze component separation for preliminary diagnosis of COVID-19, *Journal of Interdisciplinary Mathematics*, vol. 24, issue 2, pp. 353-366, (2021).