

Measuring the Students' Perception towards Changed Knowledge Sharing System during the Pandemic: A Case on Public Universities of Bangladesh

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Abstract

The COVID-19 outbreak has disrupted the education of more than 300 million students worldwide. Bangladesh was not in exception. Various educational institutions in Bangladesh have suspended classes for more than two years, and some public and private university teachers have begun to take classes and take homework online. But most students at public universities come from poor or lower-middle-class families, and many of them lack access to mobile devices and the internet, hampering the online teaching system. In this regard, the purpose of this study was to measure students' perceptions of changes in the knowledge sharing system during the pandemic. Using quantitative methods, 200 responses (students) from Bangladeshi public universities were collected through an online questionnaire between May 2021 and July 2021, according to the study purpose. Interesting findings from the study suggest that most students are comfortable with the changing knowledge-sharing system during the pandemic. It also found that online knowledge-sharing systems during the pandemic have increased students' technological efficiency. Furthermore, the study found that overall institutional efforts to transform knowledge-sharing systems during the pandemic have been sufficient. However, changing knowledge-sharing systems have negatively impacted mental health. Therefore, there is no evidence that changing the knowledge sharing system during the pandemic has had a positive impact on the overall learning environment. The findings of this study will help policymakers and educational institutions to make the changed knowledge sharing system more inclusive, practical and effective to arrange educational institutions better in future.

Keywords

Student's Perception, Knowledge Sharing System, Pandemic, Public Universities

1. Introduction

The contagious corona virus is spreading around the world. The number of victims is increasing. More new numbers are being added to the statistics every day. Everyone is blocked today for fear of corona virus. Social and economic activities are limited to prevent the spread of corona and almost all educational activities have been stopped in most countries. The education system of the whole world is now uncertain (Hamid, 2020). In Bangladesh, the government announced the closure of all types of educational institutions including schools and colleges from March 17 of 2020, which has not been launched till today. As the school is closed, alternative arrangements have been made for class, examination, and assessment. It was the first time for all the students from all the institutions including universities to attend the online class. Classes have been running online and on Parliament TV for a long time, but the service has not reached 68% of the students due to a lack of devices and uninterrupted internet connection. Such information has come up in the recent survey of the Mass Literacy Campaign (MLC) (Chowdhury, 2021). In the changed situation, teachers, students, and parents also demanded the education system be made more attractive, enjoyable, and accessible to all through the use of information technology as a preparation for the future (Azad, 2021). Because most of the students faced difficulty to perform their academic activities in terms of internet issues and they are unable to prepare themselves for a virtual class. The quality regulatory body of education is not created in this country. The main responsibility of the institution is to provide grants to public universities. Many of the executives of the government-run university still do not understand what the institutions are contributing to education.

In this situation of virtual teaching and in establishing a new method of teaching-learning, it becomes more important to know the views of the students and to find out the tendency of the students toward the teaching method such as their adaptation and revision degree if anyone wants to propose or reject it altogether (Bali et al., 2018). Following that, this study aims to measure the student's perception of the changed knowledge sharing system during the pandemic. Therefore, the specific objectives are:

- 1) To identify the effect of a changed knowledge sharing system during a pandemic on student's learning environment;
- 2) To know the student's satisfaction with changing knowledge sharing system during the pandemic;
- 3) To determine the student's efficiency through the online knowledge sharing

system during the pandemic;

4) To assess the effect of mental health because of changing knowledge sharing systems during the pandemic;

5) To identify the institutional efforts to adopt the changes in the knowledge-sharing system during the pandemic.

2. Literature Review

The pandemic and coming lockdown disrupted and affected the worldwide education system (Vu et al., 2020 as cited in Zheng et al., 2020) with far-reaching consequences on learners, teachers, and educational organizations (Mailizar et al., 2020). As a result, studies have preserved major educational delays due to the suspension of academic activities triggered by the pandemic. This may be ascribed to the closure of educational institutions, resulting in the resistance to confronting learning and intrusion of academic programs (Jacob et al., 2020). Because the impact on higher education was dramatic and transformative, a common trend to respond to epidemics in the global education system was the “emergency e-learning” protocol, which marks the rapid transition from face-to-face classes to online education. Educational institutions were facing a challenge to adapt to this change and are trying to choose the right technologies and methods to educate and engage their students (Rashid & Yadav, 2020).

A different study shows that student’s accesses to online courses are satisfied with the mode of learning. However, studies also indicate that the thoughts of learners are influenced by a host of factors (Shrestha et al., 2019; Salloum et al., 2019). Factors such as age, gender, prior knowledge of computer literacy, and the learning ways of individuals are essential predictors of technology acceptance by students. There exists spacious literature which practices the theories of “technology acceptance” to study students’ appreciation (Pérez-Pérez et al., 2020).

Country-wise research in the area as listed is contributed by Australia (Al-Kurdi et al., 2020; Kennedy et al., 2006), the United States (Kennedy et al., 2008; Kvavik, 2005), and the United Kingdom (Salaway et al., 2008). These studies confirm that a lot of learners have their own internet-enabled devices such as personal computers and mobile phones. They are using these digital devices for interaction over formal and informal stages of networking such as emails, blogging, etc. This study is based on the students’ expertise, expectation, and perception of e-learning. Consequential literature is recommended to look for the possible answers, particularly in the area of users’ ideas towards innovation.

Relying on and adapting to e-learning during a pandemic may cause a shift in adopting more online elements in the teaching by the educators. This, however, has many practical problems and limitations, in terms of the availability of digital technologies for education. There is a vast “digital inequality” that exists in society. One cannot assume that all students, as well as educators, would have access to internet connectivity and associated powerful devices outside of their university, to be able to communicate. However, according to Rashid & Yadav, during the epidemic, there has been a shift in the way of knowledge sharing in

educational institutions. More and more online content was adopted by educators who had relied on and adapted e-learning. There were also many practical problems and limitations in the availability of digital technology for education. The reason was that there is still a huge “digital inequality” in society. No one can say for sure that all students, as well as academics, are able to communicate with a strong internet connection and related devices outside of their university (Rashid & Yadav, 2020).

Similarly, Miliszewska found that feelings of friendship and kinship were limited in the virtual class. Students who cannot study self-regulated or autonomous struggle with a teacher who provides personal assistance. Online videos, digital content, and discussion forums may not provide an overall learning outcome. According to him, students face major obstacles in distance learning because face-to-face communication presents a better opportunity for the learning process, a better opportunity to share knowledge and ask for help, easier and more interactive (Miliszewska, 2007).

The study observed there are connections between course structure, learner interaction, student involvement, and instructor appearance on student satisfaction and perceived learning in virtual learning environments. This study revealed a significant communication between course structure and perceived student learning. Furthermore, the data indicated that student interaction does not have a statistically significant impact on student satisfaction yet instructor attendance does have a statistically significant impact on perceived student learning. However, the information indicated that learner interaction does remarkably affect perceived student learning. The data also indicated that instructor presence does influence student satisfaction (Khan et al., 2021). The negotiated variable, student participation, partially mediated the impact that instructor presence has on student contentment. Furthermore, student engagement fully negotiated the impact of both instructor existence and learner duplex communication on conceptual thinking student learning (Gray et al., 2016). Distance learning is still new, and it is automatically evolving with rapidly changing technologies. Thus, we can conclude that student involvement enhances the understudy’s gratification, enriches student motivation to learn, reduces the sense of isolation, and improves student accomplishment in the online learning environment. Although, delays in the reopening of higher educational institutions will further affect their psychological condition and academic advancement (Chandasiri, 2020 as cited in Zheng et al., 2020). However, literary surveys show that most of the research has been done to investigate students’ trends towards e-learning, but less research has been conducted on student perceptions about changes in the way knowledge is shared during COVID-19.

3. Theoretical and Analytical Framework of the Study

3.1. Theoretical Framework

The findings of an Indian study by Khan et al. are the most relevant to the aims

of this study; which reflect the positive perception of students towards change knowledge sharing system (e-learning) and thus the acceptability of this new education system. It has also demonstrated the importance of e-learning during the COVID-19 crisis. Indeed, e-learning has emerged as a new way to improve the learning process where social media can further improve learning output (Khan et al., 2021). In contrast, the study by Wadood et al. is sharply different from that of the Indian study by Khan et al. They defined, “Compared to Indian students and teachers, Bangladeshi students cannot cope with the changing knowledge sharing system (Wadood et al., 2020).” This can be attributed to the closure of educational institutions, which results in the closure of face-to-face learning and the disruption of academic programs (Jacob et al., 2020). In addition, if the re-opening of higher education institutions is delayed, their mental state and academic development will be further affected (Chandasiri, 2020).

However, many research studies have analyzed the impact of specific student characteristics on the adoption and implementation of online technology. These studies have been included as part of e-learning research (Alshammari et al., 2016; Al-Mushasha, 2013; Chang et al., 2017). Online delivery systems can be chosen by students based on their ability to use the Internet and other types of electronic communication systems, based on ease of use. These students are also interested in personal education. Academic achievement as part of the online approach is positively influenced by each person’s perception of the usefulness of online knowledge sharing (Proffitt, 2008). Other factors associated with individual qualities are the social impact created by the student reference group and the students’ attitudes towards online learning and these can affect their desire to learn online (Shen, 2006; Farahat, 2012). It is the behavioral intent of users that has a strong impact on their actual use of technology, which is determined by previous experience using this technology (Alshurideh, 2019; Farahat, 2012; Alshurideh, 2012; Sumak, 2011). An integrated theoretical framework that was initially put forward in a study based on the technology acceptance model (TAM) in a study by (Al-Kurdi et al., 2020) involves the adoption of e-learning and the intent to use it by university students. The study assessed the connection between university students’ intent to use e-learning and specific qualities such as “social impact, feeling enjoyment, self-efficacy, perceived usefulness, and ease of use”. In addition, it sought to formulate a general linear structural model of e-learning adoption for university students, which would influence school managers or educational practitioners to improve e-learning adoption. Some descriptive topics in e-learning usage and selected constructions were also identified (Figure 1).

To recapitulate it can be said that, the study by Khan et al. (2021) and the original version of TAM by Davis are more relevant to the aims of the current study, given the emphasis on the relationships among course structure, learner interaction, student engagement, and instructor presence on student satisfaction and perceived knowledge sharing in the online learning environments.

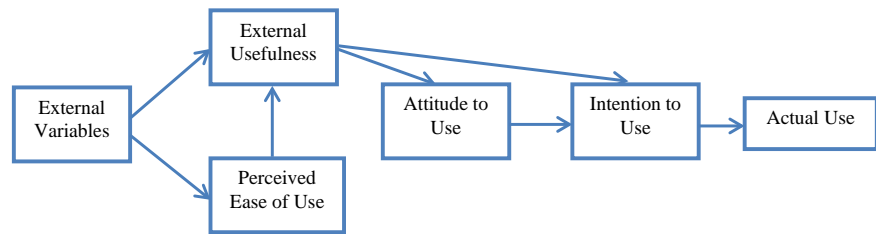


Figure 1. The original version of TAM (Davis, 1989).

3.2. Conceptual Framework of the Study

3.2.1. Learning Environment and Changing Knowledge Sharing System

Since first emerging in Wuhan, China in December 2019, the disease caused by the novel coronavirus SARS-CoV-2 has taken on pandemic proportions and severely affected the global public health and economy as well (WHO, 2020). The change in the knowledge sharing system during the pandemic composed new initiatives, extra facilities, and easier ways through the learning environment of the universities for the students through the digital platform (Al-Kurdi et al., 2020). As a result, most of the educational institutions have been closed since March and the learning process in higher education has moved online, therefore, developing countries like Bangladesh are also trying to continue classes through the online platform with a lack of technological resources, readiness, and inclusiveness from the perspective of the students. A quantitative study surveyed over 844 students of different universities in Bangladesh to analyze the status of preparedness, participation, and classroom activities online during the pandemic. The findings revealed a lack of preparedness, participation, and less scope of classroom activities through online learning. Problems of infeasible consistency of the internet and electricity, paying attention, and understanding lessons through the online platform are the main constraints of online learning in the developing country (Al-Amin et al., 2021). The online or zoom-based learning platform is offered by e-learning with an applied and humble environment, which can be able to create a positive and strong impact between teachers and students (Evans, et al., as cited in Al-Kurdi et al., 2020). With the acceptance of a knowledge sharing system, the knowledge or lecture is delivered among students at large by using the technical tools and methods, for example, the internet (Rosenberg & Foshay, 2002, as cited in Al-Kurdi et al., 2020), Zoom, email (Watkins, 2005, as cited in Al-Kurdi et al., 2020), Google Meet, chat (Kokane et al., 2014), formal and informal discussion groups (Webb et al., 2004), Facebook, Whats App, blogs (Armstrong et al., 2004). Digital learning system provides a lot of opportunities that fulfill the demand of students in terms of study materials and electronic tools facilities, knowledge, exposure, and expertise (Priyangika & Chiran, 2012). To increase the access of maximum students to higher education and to enhance productivity for the ensured quality of learning across universities, the university education system in Bangladesh has implemented the e-learning tools (Alshurideh et al., 2019 as cited in Al-Kurdi et al., 2020). We can make believe that e-learning acts as a facilitator for the teaching-learning process

(Vidanagama, 2016). As compared to the traditional learning systems, several benefits are offered by e-learning for university students (Al-Kurdi et al., 2020). Time, place, and people are needed in the traditional learning system, while e-learning has no boundaries of learning. We can utilize this limitless learning system at any time and anywhere. Since e-learning is a technology-based system, it should be understood by the developers and the deliverers how the users observe and respond to the e-learning systems (Al-Kurdi et al., 2020).

H₁: There is a positive impact on the learning environment through the change in the knowledge-sharing system during the pandemic.

3.2.2. Students' Satisfaction and Changing Knowledge Sharing System

To adapt the students to the learning environment, the difficult issues for the students' satisfaction with changing knowledge sharing system had been determined by various researchers (Salloum et al., 2019). The goal of this study was to explore the e-learning acceptance behavior of the public Universities students of Bangladesh, by whom, a better understanding of the implications to implement e-learning systems in Bangladesh universities successfully could be gained (Al-Kurdi et al., 2020). This study only aimed at the students engaged in changing the knowledge-sharing system. The students of public universities are satisfied with the necessary information and learning process. More recently, Wadood et al. studied the knowledge and perception of COVID-19 among 305 Rajshahi University students in Bangladesh. The researchers indicated that the student's understanding of COVID-19 was insufficient, and their attitudes towards the changing knowledge sharing system were also unsatisfactory (Wadood et al., 2020).

H₂: Most of the students were satisfied with changing knowledge sharing system during the pandemic.

3.2.3. Technical Efficiency among Students and Online Knowledge Sharing System

While technical efficiency systems in public universities within their campuses have been developed, the acceptance of the university students will determine the success of the system (Al-Kurdi et al., 2020). There are two levels to analyzing the adoption of technology, which is either through individual or organization. This study is aimed at the individual level, so university students are now actively considered in their daily learning process using the e-learning method (Al-Kurdi et al., 2020). The technology acceptance model (TAM) was the base of the research model of this study (Davis, 1989; Al-Kurdi et al., 2020), to justify "the technology acceptance behavior" among users which is a well-known model and implementing this model, this milestone can be achieved (Venkatesh & Bala, 2008 as cited in Al-Kurdi et al., 2020). Existing findings reveal that public universities students who are engaged with online education are expert and technically efficient in terms of MS word, MS Excel, PowerPoint, etc.

H₃: Online knowledge sharing system during pandemic increases technical efficiency among students.

3.2.4. Mental Health and Changing Knowledge Sharing System

With the closing of shops and restaurants, university students lost their part-time jobs and suffered a lot during the lockdown (Mishra et al., 2020). Many parents were unemployed or forced to close their businesses because of the coronavirus. Even in this crisis. Students are concerned about how they will overcome the financial loss during COVID-19 (Emon et al., 2020). To cover most subject lessons, there can be constant pressure among students. While online education has some negative effects, students are suffering from some important issues that affect their health such as eye problems; depression; hearing problems; and stress. Some of them live in very deep rural areas where network accessibility is rare. In another study conducted in Vietnam (Vu et al., 2020), it was found that The COVID-19 pandemic has caused unprecedented damage to the educational system worldwide. Besides the measurable economic impacts in the short-term and long-term, there is intangible destruction within educational institutions. In particular, teachers and students, the most critical resources of any educational institution—have to face various types of financial, physical, and mental struggles due to COVID-19. Students are forced to use various online learning platforms which require a high-speed internet connection. Students face barriers in class due to weak network connections which are then seen as barriers to their understanding. Sometimes it frustrates students to take part in online classes. In another study by (Gritsenko et al., 2020; Savitsky et al., 2020 as cited in Khan et al., 2021) it has been observed that the ongoing COVID-19 widespread is creating a psychologically chaotic situation as countries are counting the rapid increase in mental health problems, discomfort, discouragement, stretching, sleep disorders and fear among its citizens. The use of the substance has expanded in the long run (Ahorsu et al., 2020) and now and then self-deleterious attitude (Mamun & Griffiths, 2020; Goyal et al., 2019).

H₄: There is an effect on mental health because of changing knowledge sharing system during the pandemic.

3.2.5. Institutional Efforts and Changing Knowledge Sharing System

Since both teachers and students had the first experience of connecting through online classes it created a communication gap between them (Lapada et al., 2020). The findings of the current reveal that institutions look after maximum participation, it sounds good. Online classes through television or smartphones are working for the time being but a maximum number of students are in shortage of these devices. In rural areas, not everyone has a television or smartphone, or any other digital device. UGC is providing repayable soft loans to those students who cannot afford any digital devices but the loan disbursement has become a lengthy process. The government provides financial assistance for poor students who have no electronic devices. So, most of the time teachers have to give more effort now to shorten the time of classes and to cover maximum topics so that it can be easy for the students to cope. However, with the adoption of TAM, several researchers have identified important issues for adopting e-learning (Salloum

et al., 2019 as cited in Al-Kurdi et al., 2020). In this study, the goal was to analyze the e-learning acceptance behavior of students at UAE universities, to gain a better understanding of the impact of implementing e-learning systems in UAE universities. This study only targets students with a computing degree in the UAE university system (Al-Kurdi et al., 2020).

H₅: Institutional efforts are sufficient enough to adopt the changed education system.

After reviewing the above-mentioned theoretical and conceptual framework, the analytical framework of the study is given in **Figure 2**.

Moreover, the dependent variable and independent variables of the study are as follows (**Table 1**).

However, after spreading the virus almost 90% of the students in Bangladesh were affected in the last two years. Although there are several challenges introduction of the online education system in Bangladesh during the COVID-19 pandemic was a commendable initiative taken by the current government to reduce the loss of students' academic activities (Khan et al., 2021).

Table 1. Name of the variables and their indicators.

Name of the variables	Types of variables	Indicators
Student's Perception about Change in Knowledge Sharing System (SPCKSS)	Dependent	<ul style="list-style-type: none"> • The overall quality of changed education systems; • Time and flexibility; and • Contentment.
Learning Environment (LE)	Independent	<ul style="list-style-type: none"> • Availability of Electrical tools facilities; • Internet facilities; • Study material; and • Availability of technologies.
Satisfaction Level of Students (SLS)	Independent	<ul style="list-style-type: none"> • Collaboration and interactivity; • Course teachers' effort and lecture providing system; • Necessary information and learning process; and • Ability to understand the concept in class.
Technical Efficiency among Students (TES)	Independent	<ul style="list-style-type: none"> • Ability to use E-mail, MS Word, and MS PowerPoint; • Knowledge about internet browsing and e-communication application; and • Subject knowledge.
Mental Health (MH)	Independent	<ul style="list-style-type: none"> • Eye-sight problem; • Depression; • Hearing problem; and • Mental pressure.
Institutional Efforts (IE)	Independent	<ul style="list-style-type: none"> • Financial facilities; • Technical support; and • Satisfaction with institutional support.

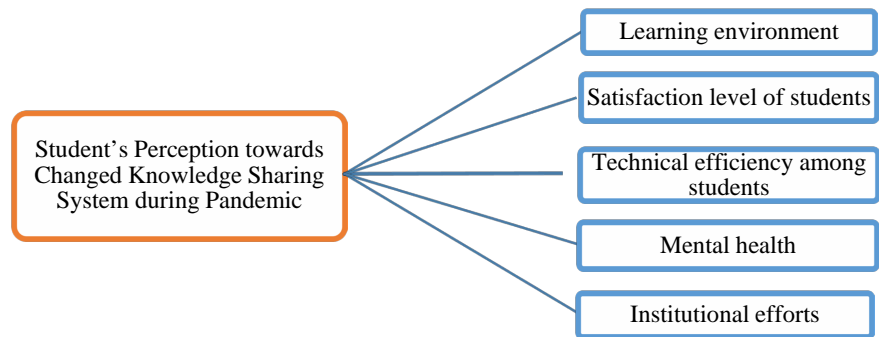


Figure 2. The analytical framework of the study.

4. Methodology of the Study

Measuring the student's perception towards change in the knowledge-sharing system during the pandemic, this study has used quantitative approaches. For quantitative survey, a structured questionnaire has been made. The desk literature survey method was used for secondary data collection.

4.1. Sample Size and Sampling Method

The population of this study were the students from the different public universities of Bangladesh. Under this study, a total of 200 sample respondents were selected from different public universities in Bangladesh following the convenient sampling technique. **Table 2** has shown the overview of the sampling design.

4.2. Methods of Data Collection

For quantitative analysis, a questionnaire survey has been conducted by the Kobo toolbox. In this regard, the study distributed survey questionnaire to the students in the different public universities of Bangladesh following convenient sampling approach. The study has closed-ended questions in this survey to test the objectives of the study. Three prime questions asked were 1) How the changing learning environment affects educational activities during COVID-19? 2) To what extent changed the knowledge-sharing method increase technical efficiency? 3) How much is the knowledge-sharing system impact mental health? The study of [Van Nguyen et al. \(2020\)](#) was also complemented in the design of this survey. This instrument comprised 41 items, out of which 28 assessed the respondent's perception of the COVID-19 pandemic based on a five-point Likert scale: 1 = strongly disagreed; 2 = disagreed; 3 = neutral; 4 = agreed; 5 = strongly agreed. All the research questions had to be responded to, as there was no shortage of details. The survey questionnaire was based on the learning environment, participation in educational activities, satisfaction level of students, technical efficiency among students, mental health, and institutional efforts.

4.3. Data Analysis

A set of summary statistics have been presented through tables and graphs to

Table 2. Socio-economic profile of the sample respondents (N = 200).

Variables	Categories	Frequency distribution	Cumulative frequency	%
Gender	Male	127	127	63.5
	Female	73	200	36.5
Age	Below 20	7	7	3.5
	21 to 25	181	188	90.5
	26 to 30	12	200	6.0
Home Division	Barishal	7	7	3.5
	Chattogram	115	122	57.5
	Dhaka	31	153	15.5
	Khulna	6	159	3.0
	Mymensingh	11	170	5.5
	Rajshahi	14	184	7.0
	Rangpur	10	194	5.0
	Sylhet	6	200	3.0
Living Area	Rural	101	101	50.5
	Sub-urban	38	139	19.0
	Urban	61	200	30.5
Name your University	Comilla University	124	124	62.0
	University of Dhaka	18	142	9.0
	Jahangirnagar University	11	153	5.5
	University of Chittagong	10	163	5.0
	Jagannath University	7	170	3.5
	Begum Rokeya University	5	175	2.5
	University of Barisha	3	178	1.5
	Bangabandhu Sheik Mujibor Rahman Science Technical University	5	183	2.5
	Shahjalal University of Science & Technology	2	185	1.0
	University of Rajshahi	2	187	1.0
	Rajshahi University of Engineering & Technology	1	188	.5
	Bangladesh University of Engineering & Technology	1	189	.5
	Sylhet Agriculture University	1	190	.5
	Chittagong Medical College	2	192	1.0
	Bangladesh Agriculture University	3	195	1.5

Continued

	Pabna University of Science and Technology	1	196	.5
	Chittagong University of Engineering & Technology	1	197	.5
	National University of Bangladesh	2	199	1.0
	Jessore Science & Technology University	1	200	.5
Major Discipline (Faculty)	Science	19	19	9.5
	Biological Sciences	2	21	1.0
	Pharmacy	1	22	.5
	Arts and Humanities	26	48	13.0
	Social Science	94	142	47.0
	Business Studies	38	180	19.0
	Engineering & Technology	6	186	3.0
	Education	1	187	.5
	Medicine	2	189	1.0
	Law	5	194	2.5
	Others	6	200	3.0
Stage of Education	Bachelor	161	161	80.5
	Masters	39	200	19.5
Father's Occupation	Public Employee	32	32	16.0
	Private Employee	15	47	7.5
	Farmer	46	93	23.0
	Unemployed	21	114	10.5
	House-husband	2	116	1.0
	Businessman	38	154	19.0
	Others	46	200	23.0
Mother's Occupation	Public Employee	13	13	6.5
	Private Employee	7	20	3.5
	Unemployed	5	25	2.5
	Homemaker	163	188	81.5
	Others	12	200	6.0
Family Income (Monthly)	Below 10,000 to 20,000	82	82	41.0
	20,000 to 30,000	62	144	31.0
	30,000 to 50,000	40	184	20.0
	More than 50,000	16	200	8.0
Do you have any device to join the virtual class?	Yes	196	194	98.0
	No	4	200	2.0

Continued

	Android phone	146	146	73.0
What kind of device do you use for the online class?	iPhone	3	149	1.5
	Tablet	1	150	.5
	Laptop	43	193	21.5
	Desktop	7	200	3.5

draw important conclusions. To look at that whether all the measured variables are expressly clarifying their particular latent constructs or not, Confirmatory Factor Analysis (CFA) technique has been applied within the study through AMOS (version 20) software. To analyze students' perceptions about change in knowledge sharing system during the pandemic, independent sample t-test has been taken through SPSS (version 20) software by the researchers. Moreover, data validity and reliability has been tested through measuring CA, CR, and AVE. Therefore model fit has been shown through RMSEA, CFI, NFI, and X^2 analysis.

5. Results and Discussion

For the collection of primary data, the questionnaire was randomly distributed by using the "KoBo Toolbox" form. Social networking sites (e.g., Facebook Messenger and WhatsApp) have been a significant source of reaching out to students of different public universities in Bangladesh. A total of 200 valid responses have been recorded that qualify for data analysis. SPSS software is used for the analysis of collected data. The demographic profile of the students (e.g., gender, age, home division, living area, name of their university, major discipline (faculty), stage of education, father's occupation, mother's occupation, and family income) the device which the students use for to join virtual class, and the student's perception towards changed knowledge sharing system during the pandemic are presented below.

5.1. Socio-Economic Profile of the Sample Respondents

This section of the paper presents some primary information about the different public university students of Bangladesh. **Table 2** illustrates the outputs of the questions related to gender, age, home division, living area, name of their university, major discipline (faculty), stage of education, father's occupation, mother's occupation, and family income. All the data presented here is based on primary data.

Table 2 depicts the personal information and socio-economic profile of the respondents classified based on their gender, age, home division, living area, name of their university, major discipline (faculty), stage of education, and socio-economic status of the respondents. The aforementioned Table stated that the majority of the sample respondents were males (63.50%) whereas the rest of 36.50% were females. This scenario displayed that, the ratio of female students in

the higher level study is lower than their counterparts male students. On the other hand, the respondents belonging to the age group “below 20” years are 3.50%, representing the voice of the youth majority (90.50%) of the sample respondents were in the age group “21 - 25” years and 6.00% of students belong to the age group “26 - 30.” In all the respondents, most of the respondents were from the Chattogram division, which was 57.50%. 15.50% belong to the Dhaka division, which is the second highest followed by Rajshahi (7.00%), Mymensingh (5.50%), Rangpur (5.00%), Barishal (3.50%), and the remaining 6.00% of the students were from Khulna and Sylhet division.

To reduce uniformity, respondents were selected from rural, suburban, and urban areas of Bangladesh. Where least amount (19.00%) of respondents were from the sub-urban areas, and the highest amount of respondents are from rural Bangladesh, which is 55.50%, and the remaining 30.50% of the students were from the urban areas. Moreover, sample respondents are distributed according to their stage of education. As shown in **Table 2**, a significant amount (80.50%) of sample respondents are in “Bachelor”, and the remaining 19.50% belong to “Masters.”

After that, to ensure diversification, various groups of students have been covered in the study as a respondent to have their views. In the case of “major discipline,” most of the sample respondents (47.00%) are from a social science background, which is almost half of the total sample respondents. Among the total sample respondents, the least amount of respondents are from pharmacy and education disciplines, both is .50%. And business studies is the second highest with 19.00%, rest of 13.00% are from the art and humanities discipline, 9.50% from Science, 3.00% from engineering & technology, 2.50% are from the law, and the rest of 5.00% are others disciplines (i.e., medicine, biological science, etc.).

All the sample respondents of this study are students enrolled in several public universities situated in Bangladesh, such as Comilla University, University of Dhaka, Jahangirnagar University, University of Chittagong, and Jagannath University and a few more public universities were included in the study. Overall, the percentages of students who are from Comilla University were higher than that of any other university in the table, which was 62.00%. 9.00% belong to the University of Dhaka, which is the second highest followed by Jahangirnagar University (5.50%), University of Chittagong (5.00%), and Jagannath University (3.50%) and the remaining 15.00% of the students were studying in Begum Rokya University, University of Barisha, Bangabandhu Sheik Mujibor Rahman Science Technical University, Shahjalal University of Science & Technology, University of Rajshahi, Rajshahi University of Engineering & Technology, Bangladesh University of Engineering & Technology, Sylhet Agriculture University, Chittagong Medical College, Bangladesh Agriculture University, Pabna University of Science and Technology, Chittagong University of Engineering & Technology, National University of Bangladesh, and Jessore Science & Technology University. In the case of fathers’ & mothers’ occupations and family income,

most of the sample respondents were from lower-middle-class families. Where most (41.00%) of their monthly family income is below 200,000 BDT. Among all the sample respondents, a significant percentage of their mothers are homemakers (81.50%) and the fathers' occupations of most of them are farmers, businessmen, and public employees, which are 23.50%, 19.50%, and 16.50% subsequently.

Finally, among 200 respondents, only 2.00% of the respondents said that they have no device to join the virtual class. Rests (98.00%) of the respondents were joining the virtual class by using an android phone, iPhone, tablet, laptop, and desktop, while a big portion of them used the android phone to participate in the virtual class.

5.2. Validity and Reliability Results

According to the validity and reliability analysis (**Table 3**), the Composite Reliability (CR) of each latent construct is higher than the acceptable limit of .70 where $CR = (\Sigma\lambda)^2 / [(\Sigma\lambda)^2 + \Sigma(1 - \lambda^2)]$. It stated that there is a strong internal consistency in the scale items. On the other hand, the Average Variance Extracted (AVE) except for the first latent construct of the table i.e., learning environment (LE) each latent construct surpasses the threshold limit of .5 where $AVE = \Sigma\lambda^2/n$. It affirms that the above-discussed CFA measurement model has strong convergent validity.

Table 3. Validity and reliability results.

Latent Constructs	λ	λ^2	$1 - \lambda^2$	CR	AVE
Learning Environment (LE)	.562	.315844	.684156	.916426	.475606
	.691	.477481	.522519		
	.693	.480249	.519751		
	.793	.628849	.371151		
Satisfaction Level of Students (SLS)	.684	.467856	.532144	.939632	.518503
	.713	.508369	.491631		
	.717	.514089	.485911		
Technical Efficiency among Students (TES)	.764	.583696	.416304	.901206	.514506
	.704	.495616	.504384		
	.79	.6241	.3759		
Mental Health (MH)	.651	.423801	.576199	.949429	.605496
	.697	.485809	.514191		
	.799	.638401	.361599		
	.798	.636804	.363196		
Institutional Efforts (IE)	.813	.660969	.339031	.944699	.638116
	.815	.664225	.335775		
	.821	.674041	.325959		
	.759	.576081	.423919		

However, testing the reliability is an exigent task because it examines the internal consistency and inspects the properties of the measuring scale (Hair et al., 2006). This study applied Cronbach's alpha as a measure of reliability, which is a commonly applied measure in Likert scale survey questions. Table 4 gives the value of Cronbach's alpha for each of the constructs considered separately. The information presented here is prepared by the Researchers by using SPSS Output.

The reliability value of Cronbach's alpha between $\pm.41$ and $\pm.70$ qualifies for moderate reliability of the scale measured, while a greater value than $\pm.70$ shows high internal consistency (Sekaran & Bougie, 2019). The Cronbach's alpha values between .70 to .90 exceed the level of acceptability (Taber, 2018). As shown in Table 4, Cronbach's alpha value of all the latent constructs (e.g. learning environment, satisfaction level of students, technical efficiency among students, mental health, and institutional efforts) is over .70 which allows internal consistency allowing for further analysis.

5.3. Participation in Online Educational Activities

Most of the students in public universities are from poor or middle-class families; most of them cannot effort the internet because of the financial crisis. Many of them do not have mobile phones and laptops to participate in online educational activities. Moreover, not only interment and device but also to ensure online course document is another main condition of online education. Course documents should be made livelier for students at this time. Brainstorming and teamwork are also difficult for students in this system. As a result, students feel less confident while using e-learning systems in a changed knowledge-sharing system. Table 5 shows the situation of students participating in educational activities during the ongoing pandemic.

In the case of participation in educational activities Table 5 reveals that 43.0% of students have participated in all online activities using e-learning technology during the changed knowledge sharing system in the ongoing pandemic situation in Bangladesh. While 31.5% said "no" and the remaining 25.5% of students were neutral. An interesting matter is that the same percentage of respondents (40.0%) said both "yes" and "no" on the matter of whether it is easy to submit an assignment, viva-voce participation, and give a presentation or not. Rests of 19.5%

Table 4. Reliability of the constructs.

Latent Constructs	Cronbach's Alpha	No. of Items
Learning Environment (LE)	.752	4
Satisfaction Level of Students (SLS)	.773	4
Technical Efficiency among Students (TES)	.752	3
Mental Health (MH)	.802	4
Institutional Efforts (IE)	.779	3

Table 5. Participation in online educational activities.

Participation in Educational Activities (PEA)								
Code	Variables	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
PEA-1	I have participated in all online activities using e-learning technology during the changed knowledge sharing system	9.5	22.0	31.5	25.5	35.5	7.5	43.0
PEA-2	It is easy to submit an assignment, viva-voce participation, and give a presentation in a changed knowledge sharing system	12.5	27.5	40.0	19.5	35.5	5.0	40.0
PEA-3	I feel confident while using an e-learning system in a changed knowledge sharing system	6.5	27.5	34.0	30.0	30.5	5.5	36.0

were neutral too. However, 36.0% of sample respondents feel confident in using e-learning systems in changed knowledge sharing systems, while 34.0% are not.

5.4. Independent Sample T-Test

An independent sample t-test is used to compare means scores between two different groups of individuals or cases in a between-participants design (for example male vs female; experimental vs control group) (Sedgwick, 2010). In this table you can see that an independent sample t-test was conducted to compare the 5 hypotheses for sample respondents following the $t(df) = t \text{ value}$, $p = p\text{-value}$ formula and the results (see Table 6) are:

H₁: There is a positive impact on the learning environment through the change in knowledge sharing system during the pandemic.

An independent sample t-test was conducted to compare the Learning Environment (LE) for sample respondents. Results showed participants who saw there is a positive impact on the learning environment through the change in knowledge sharing system during the pandemic had lower willingness scores ($M = 1.7633$, $SD = .71999$) than those who did not ($M = 2.5141$, $SD = 2.35630$). There were no significant differences ($t(4.384) = -2.279$, $p = .079$, $p > .05$). The magnitude of the differences in the means (Mean Difference = $-.75077$, 95% CI: -1.63481 to $.13327$) was not significant. Together this suggests the positive impact on the learning environment through the change in knowledge sharing system during the pandemic, not supporting our hypothesis.

H₂: Most of the students were satisfied with changing knowledge sharing system during the pandemic.

An independent sample t-test was conducted to compare the Satisfaction Level of Students (SLS). Results showed participants who saw students' satisfaction in changing knowledge sharing system during the pandemic had lower willingness scores ($M = 1.6976$, $SD = .71637$) than those who did not ($M = 2.6979$, $SD = .43665$). There were significant differences ($t(21) = -4.151$, $p = .001$, $p < .05$). The magnitude of the differences in the means (Mean Difference = -1.00030 , 95% CI: -1.50147 to $-.49913$) was significant. Together this points out most of

Table 6. Independent sample T-test.

Hypothesis	N	Mean	Std. Deviation	Levene's Test for Equality of Variances				t-test for Equality of Means				
				F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
											Lower	Upper
H₁	5	1.7633	.71999	10.511	.003	-2.279	4.384	.079	-.75077	.32949	-1.63481	.13327
	26	2.5141	.35630									
H₂	7	1.6976	.71637	4.208	.053	-4.151	21	.000	-1.00030	.24099	-1.50147	-.49913
	16	2.6979	.43665									
H₃	5	1.3167	.40277	.004	.954	-5.266	11	.000	-1.17292	.22272	-1.66311	-.68272
	8	2.4896	.38359									
H₄	4	1.3500	.63509	.327	.582	-3.894	9	.004	-1.30476	.33507	-2.06275	-.54678
	7	2.6548	.47646									
H₅	26	2.4096	.66818	9.012	.004	-2.706	36.352	.010	-0.39351	.14543	-.68836	-.09866
	32	2.8031	.35679									

the students were satisfied with the changing knowledge sharing system during the pandemic, supporting our hypothesis.

H₃: Online knowledge sharing system during pandemic increases technical efficiency among students.

An independent sample t-test was conducted to compare the Technical Efficiency among Students (TES). Results illustrated participants who agreed on the online knowledge sharing system during the pandemic increased technical efficiency among students had lower willingness scores ($M = 1.3167$, $SD = .40277$) than those who did not ($M = 2.4896$, $SD = .38359$). There were significant differences ($t(11) = -5.266$, $p = .001$), $p < .05$. The magnitude of the differences in the means (Mean Difference = -1.17292 , 95% CI: -1.66311 to $-.68272$) was significant. Together this indicates that the online knowledge sharing system during a pandemic increases technical efficiency among students, supporting our hypothesis.

H₄: There is an effect on mental health because of changing knowledge sharing system during the pandemic.

An independent sample t-test was conducted to compare the Mental Health (MH). Results suggest respondents who opine there is an effect on mental health because of changing knowledge sharing system during the pandemic had lower willingness scores ($M = 1.3500$, $SD = .63509$) than those who did not ($M = 2.6548$, $SD = .47646$). There were significant differences ($t(9) = -3.894$, $p = .004$), $p < .05$. The magnitude of the differences in the means (Mean Difference = -1.30476 , 95% CI: -2.06275 to $-.54678$) was significant. Together this conceives that there is an effect of mental health because of changing knowledge

sharing system during the pandemic, supporting our hypothesis.

H₅: Institutional efforts are sufficient enough to adopt the changed education system.

An independent sample t-test was conducted to compare the Institutional Efforts (IE) of sample respondents. Results show respondents who saw institutional efforts as sufficient enough to adopt the changed education system during the pandemic had lower willingness scores ($M = 2.4096$, $SD = .66818$) than those who did not ($M = 2.8031$, $SD = .35679$). There were significant differences ($t(36.352) = -2.706$, $p = .010$), $p < .05$. The magnitude of the differences in the means (Mean Difference = $-.39351$, 95% CI: $-.68836$ to $-.09866$) was significant. Simultaneously this institutional effort is sufficient enough to adopt the changed education system during the pandemic, supporting our hypothesis.

5.5. Confirmatory Factor Analysis (CFA)

To see whether all the measured variables are clearly interpreting their respective latent construct or not Confirmatory Factor Analysis (CFA) is applied for the confirmation. To analyze the students' perceptions towards changed knowledge sharing systems during the pandemic, several sub-constructs with their respective measured variables have been included in the latent construct namely "Student's Perception towards Changed Knowledge Sharing System during Pandemic". The CFA measurement model (Figure 3) prepared by the Researchers through AMOS Software for the same latent construct picturing how every measured variable is interrelated with its assumed theoretical construct is illustrated here.

Figure 3 illustrates that the major latent variable i.e., "Student's Perception towards Changed Knowledge Sharing System during Pandemic" is measured by its five sub-constructs namely Satisfaction Level of Students (SLS), Mental Health (MH), Learning Environment (LE), Institutional Efforts (IE) and Technical Efficiency among Students (TES). The first sub-construct "Satisfaction Level of Students (SLS)" coded as "S" is measured through four statements (SLS8, SLS9, SLS10, and SLS11) which are represented by rectangles as the convention followed for observed variables. Similarly, the second sub-construct "Mental Health (MH)" coded as "M" is measured through four statements coded (MH15, MH16, MH17, MH18). Likewise, the variable namely "Learning Environment (LE)" coded as "L" measured through four statements (LE1, LE2, LE3, and LE4). The fourth sub-construct "Institutional Efforts (IE)" coded as "I" is measured by three statements coded as IE19, IE20, and IE21. Finally, the fifth and final sub-construct "Technical Efficiency among Students (TES)" is coded with "T" which is measured by three statements (TES12, TES13, and TES14). The small circles with arrows show residual terms, which represent how much variation in the endogenous variable is unexplained by the exogenous variable. Factor loading for a given item is mentioned in the proximity of the pointing arrow drawn and multiple correlations are mentioned above each response item of a manifest variable.

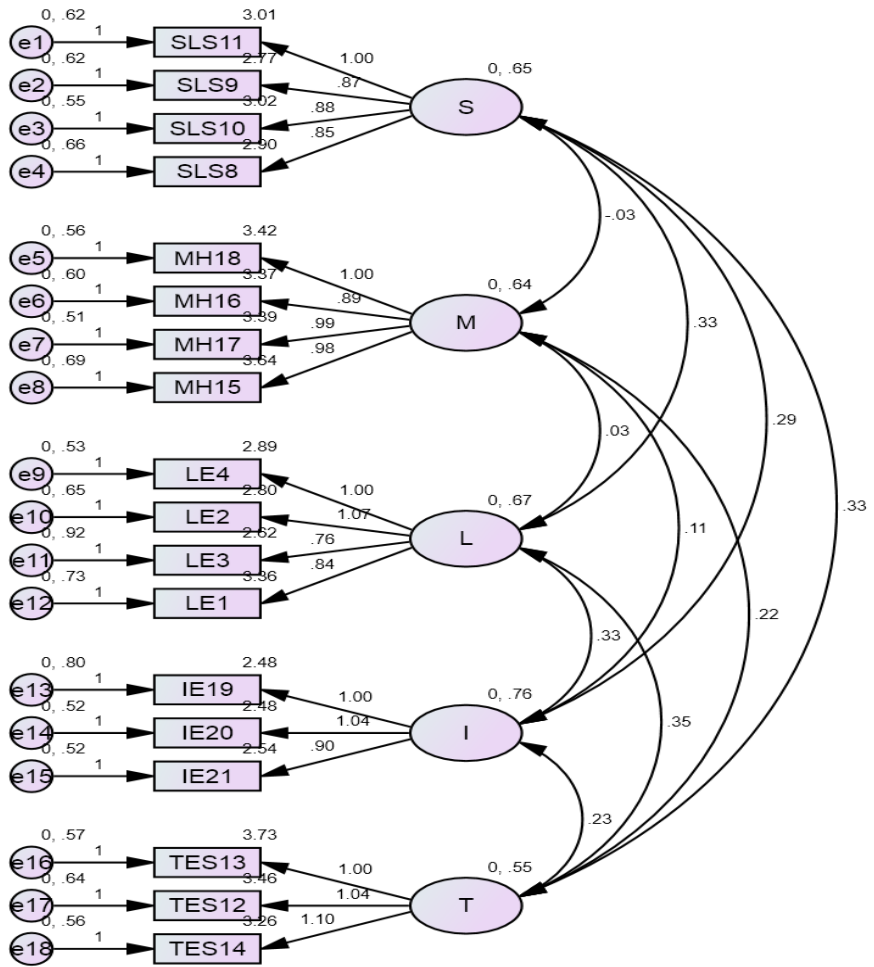


Figure 3. CFA measurement model for “students’ perceptions of e-learning”.

5.6. Model Fit

Table 7 shows that the Chi-square *p*-value is 1.181 (more than 5%) and CMIN/DF value is 1.494 (less than 3) which reveals that the data is compatible with the model fit. The model also generated other indexes of model fit i.e., CFI = .944, NFI = .853, TLI = .923 all of which excel in their threshold limits depicting that this is a well-fitted model and two indices of badness i.e., RMSEA = .048 (less than .10) reveal that the data fits the model appropriately because lower RMSEA value indicates a better fit. Thus, it can be said that the aforesaid CFA measurement model is a well-fitted model.

5.7. Student’s Perception about Change in Knowledge Sharing System

This part of the study aims at fetching the information regarding students’ Perceptions about Change in Knowledge Sharing System by the Likert scale (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree). The broad headings contain learning environment, satisfaction level of students, technical efficiency among students, mental health, and institutional efforts in changed knowledge

Table 7. CFA model-fit summary.

Model Fit Indices	Threshold Limits	Values Attained
X²	<i>p</i> -value > .05	1.181
RMSEA	<.05 good fit; .05 - .10 mediocre fit; and if >.10 bad fit	.048
CFI	>.95 great; >.90 traditional; and if >.80 sometimes permissible	.944
TLI	>.90	.923
NFI	>.90	.853
CMIN/DF	<3 good; and if <5 sometimes permissible	1.494

sharing system during the pandemic. The study aims to know the perception of students on their satisfaction, and efficiency through the online knowledge sharing system, assess the effect on mental health and identify the institutional efforts in changing the knowledge sharing system. Except “Neutral,” “Strongly Disagree” and “Disagree” were merged to get one specific response from the sample respondents which is “Disagree” and also “Strongly Agree” & “Agree” are united together to form one positive response i.e., Agree. The results are shown in **Table 8**.

In the matter learning environment of the present situation, 57.0% of respondents have available electrical tools facilities for interactive communication; while 24.0% said they didn’t have and the rests of them were neutral. On the other hand, respectively 47.0% and 56.5% of respondents don’t have sufficient internet facilities and materials (books, journal/articles, several documents, etc.) to study online. Additionally, 41.0% of respondents don’t have the available technologies to participate in the test and submit an assignment electronically.

In terms of the satisfaction level of students, more students are found to be satisfied than those who are dissatisfied with the virtual knowledge sharing system (35.0% and 33.0% respectively). Therefore 44.5% of total respondents are pleased with the course teachers’ efforts and lecture with the changing system. Moreover, 38.0% of the respondents believe that the changed knowledge sharing system helps to find necessary information easily and simplified the learning process, while 33.0% don’t. When it comes to understanding ability, 40.0% of the respondents founds changed knowledge sharing method not only improved their ability to understand concepts in class but also widen their knowledge.

It is expected that the present education system will make students technically efficient. Researchers have found that changes education system has made respondents technologically sound. The change education system has helped 57.5% of them incapable of using E-mail, MS Word, and MS PowerPoint, 70.50% to know more about internet browsing and e-communication application (Zoom/Google Meet), and 49.0% believe that e-learning helps them to get updated subject knowledge with the latest amendments.

Table 8. Student's perception of change in knowledge sharing system (N = 200).

Code	Variables	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
Learning Environment (LE)								
LE-1	Electrical tools facilities are available for me for interactive communication with the instructor without meeting face to face	7.5	16.5	24.0	19.0	47.0	10.0	57.0
LE-2	Internet facilities are sufficient enough to study irrespective of where I am located in the world	14.5	32.5	47.0	18.0	28.5	6.5	35.0
LE-3	Materials (Books, Journal/Articles, several documents, etc.) are available to perform distance learning	15.5	41.0	56.5	14.5	24.5	4.5	29.0
LE-4	Technologies are available to participate in the test and submit an assignment electronically	10.5	30.5	41.0	23.5	31.0	4.5	35.5
Satisfaction Level of Students (SLS)								
SLS-8	I believe participation in the virtual knowledge sharing system is user friendly which improved collaboration and interactivity among students	29.5	3.5	33.0	32.0	12.0	23.0	35.0
SLS-9	Course teachers' effort and lecture providing system are helpful and sufficient enough	26.5	3.0	29.5	26.0	11.0	33.5	44.5
SLS-10	I believe that the changed knowledge sharing system helps to find necessary information easily and simplified the learning process	7.5	25.5	33.0	28.5	34.5	4.0	38.0
SLS-11	Changed knowledge sharing method not only improved my ability to understand concepts in class but also widen my knowledge	11.0	23.5	34.5	25.5	33.5	6.5	40.0
Technical Efficiency among Students (TES)								
TES-12	I believe distance learning makes me capable of using E-mail, MS Word, and MS PowerPoint	5.5	16.5	22.0	20.5	41.5	16.0	57.5
TES-13	I feel change the education system assist me in know more about internet browsing and e-communication application (Zoom/Google Meet)	5.0	9.5	14.5	15.0	49.0	21.5	70.50
TES-14	I believe that e-learning helps me to get updated my subject knowledge with the latest amendments	7.0	20.0	27.0	24.0	38.5	10.5	49.0
Mental Health (MH)								
MH-15	I feel the e-learning process created the eye-sight problem	5.5	13.0	18.5	17.5	40.0	24.0	64.0
MH-16	I feel depressed through the e-learning process in the changed knowledge sharing system	5.5	15.5	21.0	27.5	40.0	11.5	51.5
MH-17	The E-learning process of changed knowledge sharing system causes the hearing problem	4.0	19.0	23.0	25.0	38.5	13.5	52.0
MH-18	E-learning process in changing knowledge sharing system forces to increase mental pressure	6.0	15.5	21.5	23.5	41.0	14.0	55.0
Institutional Efforts (IE)								
IE-19	My university provides financial support to participate in online activities using e-learning technology	20.5	6.0	26.5	15.5	27.0	31.0	58.0
IE-20	My university ensures technical support to carry out online e-learning activities	13.0	6.5	19.5	24.5	22.0	34.0	56.0
IE-21	I am overall satisfied with institutional support to adapt to the changed education system during the pandemic	18.0	2.5	20.5	29.0	19.0	31.5	50.5

The study also found that there are few connections between the change education system and mental health. Among all the respondents 64.0% respondents feel the e-learning process created the eye-sight problem, 51.5% feel depressed, 52.0% realize the hearing problem, and 55.0% suspect the e-learning process in changing knowledge sharing system forces increase mental pressure. The rest of them have listed them as neutral and disagree.

Finally, in terms of financial and technical support, the study finds that the overall institutional efforts in the change knowledge sharing system in pandemics were sufficient enough. Because, most of the respondents received financial (58.0%) and technical (56.0%) support to participate in online activities using e-learning technology. Finally, 20.5% of the respondents were dissatisfied while 50.5% were satisfied with the overall institutional support to adapt to the changed education system during the pandemic. However, 29.0% of the students were undecided about the overall institutional support.

6. Conclusion

6.1. Summary of the Result of the Study

From the analysis of this study, it is found that most of the students are comfortable with the changing knowledge-sharing system (online education) during the pandemic. It also found that online knowledge-sharing systems during the pandemic have increased students' technological capacity and efficiency. Furthermore, the study found that overall institutional efforts to transform knowledge-sharing systems among the students during the pandemic have been sufficient but need to develop services following the standard way of institutional learning. However, changing knowledge-sharing systems have negatively impacted mental health a lot. On the contrary, there is no evidence found that changing the knowledge sharing system during the pandemic has had a positive impact on the overall learning environment that is a big concern for the policy makers as well as the education specialists.

6.2. Limitations and Recommendations

Due to the Corona epidemic, there is a kind of stagnation in the education system of Bangladesh. Although online education activities started long ago in developed countries of the world, this idea is new in this country. Thus the present study aims to analyze the student's perception of the changed knowledge sharing system during the pandemic. This result emerges in the learning environment, satisfaction level of students, technical efficiency among students, mental health, and institutional efforts. To reduce uniformity, the study verified the usability of the changed knowledge sharing system, such as ease of study from a geographical location. The study discloses that almost half of the total respondents have not been participating in online educational activities. Most of them cannot use the internet due to the financial crisis. Not having mobile phones and laptops is found to be one of the major reasons for students to opt for online educational

activities. There is a lack of modern technological facilities in rural and hilly areas, which is a big challenge for online education. The positive thing is that the new system getting popularity in the country day by day. Though students are satisfied with the institutional and course teachers' efforts, the study found that the changed knowledge sharing system improves students' ability to understand concepts in class which is helpful in widening their knowledge. Because it is very much easy for students to find out the necessary information in the changed knowledge sharing system, which is simplified the learning process.

Thus, the country needs to find strategies to effectively manage online education to move the education system forward. To enjoy online learning activities, student participation is necessary to ensure proper arrangements for conducting examinations and verifying their achievements. In addition, it is important to develop the capacity of teachers in the online higher education sector with the necessary training and formulate online and blended learning policies, and take necessary steps to address the challenges in this regard. Otherwise, online learning will not be effective and ultimately student dropouts will be increased.

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Conflicts of Interest

The authors declare there is no conflict of interest among the authors.

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