International Journal of Business and Technopreneurship
Volume 13, No 1, February 2023 [1-22]

The Impact of Technological and Social Factors on Students' Engagement in Online Learning: Evidence Based on Self-Determination Theory

Rumana Afroze[1] and Sujana Shafi[2*]

[1]Department of Business Administration, East West University, Bangladesh
[2]Faculty of Business, Economics, and Social Development, Universiti Malaysia Terengganu, Malaysia

Received 4th December 2022, Revised 28th December 2022, Accepted 17th February 2023

ABSTRACT

This study addresses and investigates university students' engagement and perspectives on utilising online learning in Bangladesh. The goal of this study is to pinpoint the variables that affect students' engagement technologically and socially and to understand the level of students' engagement in an online learning environment. This research used the quantitative method. The respondents to this research were undergraduate and postgraduate students from both private and public universities in Bangladesh, located in different locations. The number of respondents was 201. A structured questionnaire obtained via Google Form was used to determine the level of engagement and understanding of using online learning. SPSS was used to analyse the data that had been gathered. Outcome has demonstrated that the technological factor influences students' engagement, such as the necessity of a device or gadget. Also, social factors like engagement in classes and mental health issues positively influence students' engagement in online learning. Overall engagement in online classes is low because there is less communication and assistance from classmates, and students' engagement during online learning is influenced by mental health issues. The self-determination theory has been adopted to represent this study's variables and also to understand students' engagement in online learning. This research's recommendations, based on the findings, include the necessity for serious measures to support students' psychological wellbeing and their personal and financial concerns, and that more engagement with classmates should be ensured and improved by the academicians and university authority.

Keywords: Online Learning, Self-Determination Theory, Students' Engagement

1. INTRODUCTION

Digital learning has frequently been chastised for a poor level of student engagement, which is caused by teachers' absence physically and an inadequate level of direct interaction with the students. Students' disengagement, according to critics of digital education, is a significant factor in this educational concept's incapability to positively influence all interested parties. This is disappointing for students and may lead to poor academic performance (Aldhafeeri & Alotaibi, 2022). The current transition to online learning during the COVID-19 pandemic has posed challenges for both teachers and students (Elshami et al., 2022) from web-based connections to vibrant and interactive era of virtual world technologies, information technology has continued to evolve. Work, connectivity, relaxation, and education are just a few of the areas of modern society where the development of information technology has had a significant impact. Educational institutions are experimenting in a number of nations with new technological developments to carry out educational activities and communicate with students (Bower et al., 2016).

*Corresponding Author: sujanashafi006@gmail.com

In the field of education in online learning environment, social factors have been identified as a critical factor that affect student engagement in online learning (Lim, 2004). Learning engagement is recognised as a critical indicator in the evaluation of online courses because it is related to the quality of online education and the performance of students (Wang et al., 2022). The involvement and engagement of students are acknowledged as having a significant impact on learning and performance, particularly in online learning. Moreover, student engagement is the motivation factor for maximise learning opportunities and decrease dropout (Tualaulelei et al., 2021). Student participation is essential to their learning and happiness. Engagement refers the energy and effort that students employ within their learning community (Bond, 2020; Martin & Bolliger, 2018). Engagement also refers the effort that the learner makes to acquire knowledge and build his/her critical thinking skills through staying involved in the learning process (Dixson, 2015). Student engagement is defined as their active participation in instruction-ally effective techniques and their dedication to academic objectives and learning.

Online learning for students' study and engagement not only started in COVID-19. It has been going on for a while. It wasn't the first time that activities associated with traditional education were postponed. Not only did the H1N1 Flu outbreak significantly affect education activities in 2009, but the SARS coronavirus (SARSCoV) also had a detrimental influence on traditional educational activities in a huge number of countries worldwide (Cauchemez et al., 2014). Similar to how COVID-19 forced academic professionals to reevaluate the conventional method of face-to-face learning, they began to consider distance learning as a practical option to fill the void left by the classroom for a period of three to four months, reducing the risk of infection for students before traditional activities are resumed (Kaur, 2020). Numerous colleges offer online courses, however there are two issues. First, very little is known about the consequences and effectiveness of online education from a macro perspective. Second, the variety of learning objectives that direct our instructional and educational priorities is likely to cause the ability to teach well in the digital environment to vary (Liguori & Winkler, 2020). Although the internet is the most widely used digital channel, there are additional options such as text messaging, video calling, zoom, Google Meet, and other video platforms that are easily accessible with any device, wireless, mobile apps, digital mobile or laptop online instant chatting for making group projects, connectivity, and more (Shafi et al., 2022).

Online learning can be defined as a tool that can make the teaching–learning process more student-centered, more innovative and even more flexible (Dhawan, 2020). Not the ability of online teaching and learning methods to deliver high-quality education is being questioned during this difficult period; rather, the question is how academic institutions will be able to implement online learning in such a broad sense (Carey, 2020). Online education is defined as "learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students" (Singh & Thurman, 2019). The internet has completely changed the rules of education and marketing around the world. In terms of education and digital platforms to connect remotely, the internet has changed the way people interact (Afroze & Shafi, 2021). In times of crisis, technology offers creative solutions that enable individuals to connect and even collaborate digitally without the necessity for in-person engagement (Mark & Semaan, 2008). Sometimes student finds online teaching to be boring as they want two-way interaction. Students feel lack of community, technical problems, and difficulties in understanding are the major barriers for online learning (Song et al., 2004).

Direct communication and human touch are lost in case of internet-learning. It can make it more difficult for students and teachers to communicate so that users can face many technical difficulties that hinder and slow-down the teaching–learning process (Favale et al., 2020). Institutions must focus on creative, relevant, student-centered, collaborative learning, case learning and project-based learning through online instructions (Kim et al., 2005). Teachers must

develop efficient methods for delivering lessons online (Partlow & Gibbs, 2003). Effective online lessons encourage learner input, encourage inquiries from learners and widen the learner's perspective (Keeton, 2019). Self-determination theory (SDT) appears to be an appropriate framework for addressing motivation in the online learning environment, based on a number of factors. For starters, SDT can be used as a theoretical framework for integrating issues in online learning. SDT explains student engagement by focusing into three strategies. Involvement, autonomy and structure that concentrate education with well-designed digital materials. Autonomy for permitting options in digital format and sharing tools (Chiu, 2021). Teachers' practices, which promote autonomy, ensure learning and include students in interpersonal interactions, are crucial in fostering student motivation in online learning (Chiu & Mok, 2017).

Hence this study has segregated the variables into two categories which are technological and social factors. Under technological category access to high-speed internet and necessary device and gadget issues will be discussed as an influencing factor. In addition to that under social factors students' engagement in classes and mental health issues will be addressed as an impact factor for this study. Here, the first objective of this study is to identify the impact of the factors technological and social that influence students' engagement in online learning environment. The second objective is to understand the level of engagement of university students in online learning environment.

2. LITERATURE REVIEW

For the past two decades, online learning has been a significant learning activity. It entails the aligned use of components as well as interactive discussion (Elshami et al., 2022). The digital revolution has reshaped nearly every industry, including higher education. Online courses that enrol thousands of diverse learners from around the world are disrupting face-to-face classes that typically enrol a few dozen largely homogeneous students. The students' engagement parameter affects the current assessment of online learning, the transformation in participation frequency ever since emergence of internet classes and the desired method of study (Szopiński & Bachnik, 2022). Remote instruction has gradually become more common place with the rapid adoption of educational technology and computer-assisted learning, and online learning has evolved as an appealing way of learning. Students, for example, can take courses not only in traditional classrooms, but also through MOOCs (Massive Open Online Courses) (Wang et al., 2022). In order to maximise the student experience, improve the learning outcomes and development of students and improve the performance and reputation of the institution, both students and their institutions must invest time, effort, and other pertinent resources. This is what is meant by student engagement (Trowler, 2010).

At numerous gatherings, the use of technology in education is frequently discussed. Selwyn (2016) disputes that this is frequently exaggerated, despite the fact that there are both positive and negative effects of information technology use on its consumers. Technology is highly used with students' engagement in case of online learning in various situation. Hence many factors affect online learning for students' engagement specially for university level undergraduate and postgraduate students. Barriers to online learning include some social problems those are psychological distress, financial strain, and costs associated with attending online classes, and technological factors such as expensive internet, device, and network costs (Saha et al., 2021). The study found a significant decrease in pupils' learning experiences when particularly in comparison to their regular classroom encounter, which is linked to a reduction in psychological health, involvement, and involvement in classes (Van et al., 2022). Students' engagement connects to students' commitment and effort in the study, both of which would improve their academic performance (Wang et al., 2019). A study found that 60% were attended their online classes. 42% only attend in the exam. 18% students have given more time for studying during online than normal time. 22.5% do not have separate room for study (Alsoud & Harasis, 2021). In research

from Saha et al. (2021), found that zoom, google meet are used for taking class. Electricity is required for online education, but according to data, 1.5 billion people worldwide experience regular power outages. Poor internet connection creates problem while doing classes. Assignment deadline and capacity of phone devices create mental pressure among the students. Moreover, students' satisfaction percentage is limited about internet connectivity, electricity, mobile network level and about the capacity of the devices (Nitu et al., 2020).

In this study four variables have been discussed, those are necessary device issue, reliable internet, class engagement and mental health of a student. This study has tried to explain this scenario and variables with the light of the SDT. The review of existing literature for such factors with the involvement of the SDT is given below.

2.1 Technological Factors

2.1.1 Necessary Device and Gadget Issues and Students' Engagement in Online Learning

Another significant obstacle to online education in Bangladesh is that many students, particularly those attending university classes, are unable to acquire a desktop or laptop with the essential devices. According to a study 18.1% students do not have a device to attend online class (Alsoud & Harasis, 2021). The respondents said the financial crisis, which impacted on their studies. Previously they managed their expenses by doing part time work but now during this pandemic situation they could not managed part time job. Even their family's income was drastically reduced because COVID-19 had already had a detrimental effect on the economies of Bangladesh and the world. The participants found it challenging to handle extra money to buy any devices like laptop, tab, mobile and any other devices. Students' discomfort and unhappiness with online learning programme was discovered by (Al-Tammemi et al., 2020). Therefore, this necessary device and gadget issues influence students' engagement in online learning environment. Thus, H_1: Necessary device and gadget issues influences students' engagement.

2.1.2 Access to High Speed and Reliable Internet Network Service and Students' Engagement in Online Learning

Students faced trouble adjusting to online lectures, dealing with new workloads and evaluation methods, connecting with lecturers, and dealing with a variety of problems specific to online learning, like a lack, poor or no internet access, exorbitant internet charges, poor network etc. Given that they had to rely on their families for daily needs and that taking online classes was expensive, it was difficult for the participants to manage extra money to purchase internet packages. Given that they had to rely on their families for daily needs and that taking online classes was expensive due to buying internet, modems, WIFI or mobile data packages (Owusu-Fordjour et al., 2021). There are numerous technologies available for taking online classes, however they can occasionally cause significant problems. These challenges and troubles with modern technology include things like download glitches, installation problems, login issues, audio and video issues and more (Dhawan, 2020). So, this problem can lead students to have less attendance and less engagement in online classes and exams. According to Alsoud and Harasis (2021), 33.5% students feel anxiety about internet connectivity. Therefore, this access to high speed/reliable internet network service influence students' engagement in online learning environment. Thus, H_2: Access to high speed and reliable internet network service influences students' engagement.

2.2 Social Factors

2.2.1 Participation in Classes and Students' Engagement in Online Learning

One of the most common issues encountered during the online learning process is a lack or absence of students' engagement. In online learning environments, they may experience difficulties with behavioural engagement, cognitive engagement, and emotional engagement. Most e-learning systems offer web-based learning, which allows students to access the same online courses without adaptation based on their profile and behaviour. Learners must interact with the system in an online learning environment (Pham & Dau, 2022). For a variety of reasons, including being disorganised, less motivated, and unable to form new academic habits in this situation, the majority of participants reported experiencing anxiety. Uncertainty was experienced by the participants as a result of the start of the new academic year, the return of exam and class periods, the announcement of results, and promotions (Dutta & Smita, 2020).

Learners in online learning environments frequently engage in self-directed learning activities. Students might not always be able to interact with both the teacher and other students in this setting because so many students use it at different times. Since there are so many students using the online learning system, it is challenging for the teacher to give each student individualised feedback. Students may struggle in these settings, where there is little teacher support, with issues like not knowing what to do or getting lost in online learning environments, as well as a lack of appropriate friendships or understanding with classmates to ask for help. Depending on the severity of these issues, the students' engagement may wane over time. This may result in the student failing online learning (Schumacher & Ifenthaler, 2021). Therefore, this students' engagement or interaction with teachers and other classmates in classes influence students' engagement in online learning environment. Thus, H_3: Participation in classes influences students' engagement in online learning.

2.2.2 Mental Health Issues and Students' Engagement in Online Learning

The extended closure has a big effect on their mental health as well as their academic life. Studies have shown that students are more likely to have mental health issues such as anxiety, sadness, stress, fear, substance abuse, poor sleep quality, and suicidal conduct (Ela et al., 2021). The prolonged home quarantine period disrupted and negatively affected the way that students studied and completed their assignments, which eventually led to an increase in stress and dysfunctional learning strategies. Stress was the most frequently mentioned mental health problem among the respondents. They were discovered to be under considerable academic pressure (Meo et al., 2020).

According to a survey, 73.7% students said that low income of their family affects their education (Alsoud & Harasis, 2021). Students at both private and public universities frequently experience sadness, stress, and anxiety. Furthermore, according to a different study, they have sleeplessness and additional factors such as educational barriers, prospective professional challenges and financial crisis can all contribute to stress (Islam et al., 2020) and (Ahmed & Sifat 2021). E-learning has an effect on students' mental health conditions, with a growing number of students suffering from stress, complexity focusing in class, discontentment about their academic outcomes; very little sleep from staring at a monitor for long periods of time; exhaustion from feeling lonely; and so much less involvement or inspiration than face-to-face classes throughout online class hours (Van et al., 2022). Therefore, this mental health issues influence students' engagement in online learning environment. Thus, H_4: Mental health issues influences students' engagement.

The research framework of this study is presented in Figure 1.

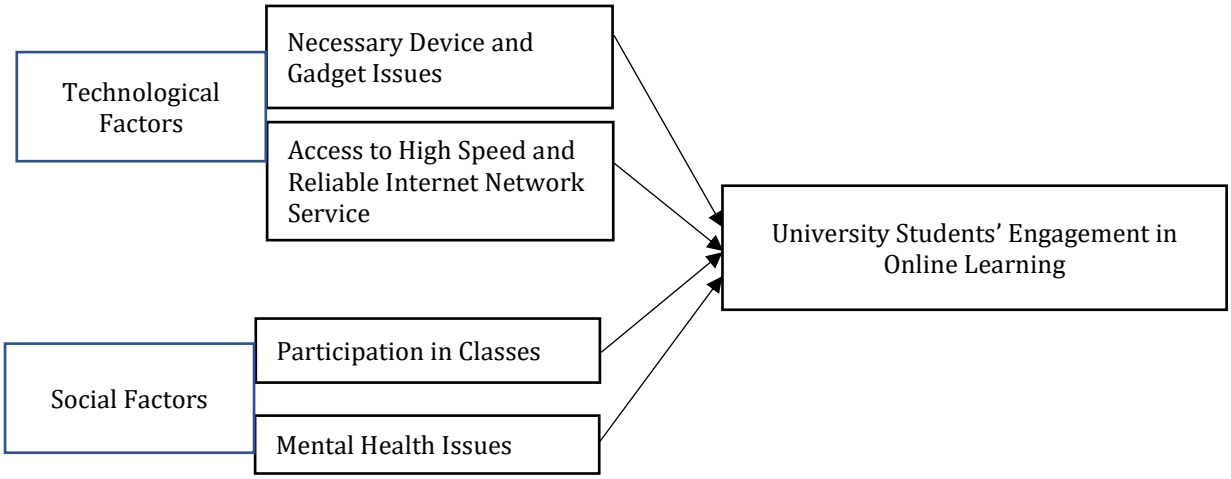

Figure 1. Research Framework

2.3 Theoretical Underpinning

The Self-Determination Theory (SDT) provides a motivational theoretical framework with significant implications for both classroom practice and educational reform policies. According to the theory, all people have three basic psychological needs: autonomy, relatedness, and competence, which motivate self-initiated behaviour and engagement. Teachers, according to SDT, can motivate student engagement by meeting their needs. Students' motivational orientation can shift along a continuum from amotivation to external motivation to intrinsic motivation as they internalise their motivation till something intrinsic about the interaction keeps driving them (Ryan & Deci, 2020). The SDT (Miller et al., 1988) is employed as the theoretical framework to examine the motivations of human (Ryan & Deci, 2020; Buzinde, 2020). The three psychological preconditions of autonomy, competence, and relatedness, which determine people's motivation to engage in activities and how their behavior affects performance well-being, are the focus of SDT (Jeno et al., 2017). A macro-theory of human motivation and personality called SDT examines these connections and provides an explanation for why students behave well in the classroom. SDT has investigated the effects of autonomy-supportive environments on health, performance, and participation in a range of contexts, including, education, sport, and physical exercise. Numerous researches carried out over the past three decades, specifically in the context of education, have backed SDT. The focus on individuals who take pleasure in, are engaged in, and find fulfillment in the growth of a task as well as the key contributors to its integrating character are those who are more self-aware, more capable, and more self-determined than others (Serafini et al., 2020).

2.3.1 Autonomy

The social determinants that support a person's belief of their own agency, competence, and connectedness according to SDT, encourage the highest-quality sorts of activity engagement. Individual functioning is influenced by contextual factors such as autonomy support. In research from Deci and Ryan (2008), contend that autonomy support encourages choice, lessens the need for precise execution of tasks, and supports initiative. Individuals must experience the following conditions in order to feel supported in their autonomy: giving justifications that are meaningful, acknowledging uncomfortable emotions, using non-controlling language, offering choices that are meaningful, cultivating internal motivational resources, exhibiting unconditional positive regard, and being patient to allow time for self-paced learning are all examples of meaningful justifications (Scott, 2017). Numerous studies have connected autonomy-supportive instruction

to a range of positive educational outcomes, such as learning, safety, and effectiveness. As a result, it can be linked to our dependent variable, the influence of online learning on the engagement of university students. Through promoting activities that meet students' demands for competence, relatedness, and most importantly autonomy, autonomy support, according to SDT, offers them enormous psychological advantages (Deci & Ryan, 2008). It might be connected to factors affecting our psychological instability. Numerous studies demonstrate that teachers' autonomy support affects students' sense of autonomy (Reeve & Tseng, 2011). Teachers will offer and suggest different digital resources and highlight how they apply to pupils (Bedenlier et al., 2020). They will enable students to complete assignments utilising any digital format (such as presentations, photos, blogging, and apps) and will also enable them to study whenever and wherever they want (Trenshaw et al., 2016).

2.3.2 Competence

Teachers will give students explicit guidelines and standards for digital submissions, as well as videos for technical difficulties, by applying multimedia learning concepts to the design of digital materials and designing for small screens (Chiu & Mok, 2017). A few examples include giving students competence-relevant multimedia feedback. The right tools and high-speed internet network services must be available to kids in order for them to get this.

2.3.3 Relatedness

A student's active participation in a learning activity is referred to as engagement (Christenson et al., 2012). In research from Jang et al. (2016) claim that engagement is a multifaceted entity with four interrelated dimensions: behaviour, emotion, cognition, and agency. Behavioural engagement among students in a learning activity is defined as their focus, perseverance, and effort (Núñez & León, 2015). When a person is engaged in a task, they are emotionally involved when positive feelings (like interest) are present and negative sensations (like anxiety) are absent (Skinner et al., 2008). Cognitive engagement refers to the employment of more in-depth learning strategies, such as elaboration, as opposed to surface-level learning strategies, such as memorisation, while a student is attempting to learn (Walker et al., 2006). Last but not least, agentic engagement describes how much students engage in the process of learning by raising concerns, expressing their preferences, and making demands (Jang et al., 2016). Every component serves a unique purpose in the internal dynamics of interaction (Skinner et al., 2008). Small teacher-student support groups with a maximum of five students will be led by teachers using messaging tools to offer interactive, real-time classes that are emotionally designed (Chiu, 2021); and use visual aids such as images and emoji for communication to avoid misunderstanding and promote a positive environment. In order to complete group projects, assignments, and other activities, students must also engage with other students in the class.

2.4 Research Gap

After analysis of the above literature, it can be said that all of the variables that have been used in this study all together, it has not been studied earlier in Bangladeshi context. Furthermore, the integration and use of the SDT with the variables in this study is also a new addition in this topic in perspective of Bangladesh. The SDT has been linked with each variable in this study. Previously all of the studies in this arena in terms of Bangladesh have been done mostly on the undergraduate students and also in any particular institutions based (private or public). But this study focuses on both public and private university students who are both undergraduate and postgraduate students. Therefore, this combination is something new in this field in the context of Bangladesh.

3. METHODOLOGY

The quantitative research approach was employed in this study to understand potential responses and to answer and identification of the research objectives from undergraduate and postgraduate students of Bangladesh from both public and private universities. The term "gathering of information from a sample of persons through their responses to questions" refers to survey research. This kind of study permits the use of numerous techniques for participant recruitment, data collection and instrumentation. Quantitative research techniques can be used in survey research, for example use of questionnaires along with numerical items (Check & Schutt, 2012). Because the study's objective was to assess the factors influence students' engagement in technological and social perspective, and also to know the level of engagement, quantitative analysis has been done to gain a better understanding of students' engagement and experience with online learning. Primary data was gathered from a total of 201 undergraduate and postgraduate students who are currently enrolled in different public and private universities in Bangladesh in multiple divisions with the aim of shedding light on the strategy for engagement, potency, perception, difficulties, psychological processes as seen from the viewpoint of student happiness and experience. According to the University Grant Commission (UGC), Bangladesh Research and Education Network (BDREN) provides funding for online instruction at 147 out of the 153 public and private institutions in the country. The study's participants were chosen using a convenience sampling method. A convenience sample is one that is drawn from a source that is conveniently accessible (Andrade, 2020). A special kind of non-probability sampling technique called convenience sampling, also known as availability sampling, relies on data collection from population members who are easily available to participate in the study (Saunders, 2022). The focus of the study was to understand the factors that impact engagement in Bangladeshi undergraduate and postgraduate students from both private and public institutions.

The undergraduate and graduate students at public and private universities in Bangladesh were the main subject of this study. As a result, the conclusions drawn from primary data were more accurate representations of all undergraduate and graduate students in the nation. Respondents are from public and private institutions and they were chosen from Dhaka, Savar, Khulna, Chittagong and Rajshahi, respectively to provide an accurate representation of the entire country. 201 undergraduate and graduate students from various public and private universities in Bangladesh were chosen at random by convenience sampling. They were contacted via a number of social media platforms (Facebook, WhatsApp and email). For one and a half months, the questionnaire was given to a number of pupils from various universities in Dhaka, Savar, Khulna, Chittagong and Rajshahi. To finish the investigation, primary data were collected. Primary data were collected using online google doc surveys during the pandemic because the study aimed to comprehend the potential solution and quantify attitudes, engagement, effectiveness, problems and psychological status from the perspective of students' experiences and satisfaction with emergency online learning. A Google Form was used to create a questionnaire with a total of 15 items on a five-point Likert scale, which were then organised into 6 sections in accordance with the study's goals. Two closed-ended questions about the demographics of the respondent make up the first section of the questionnaire.

4. ANALYSES AND RESULTS

In this study, following analyses have been done to answer the research objectives. Respondents' descriptive analysis to depict some of the important question's responses also to know the level of engagement of students in the online learning environment, KMO's and Bartlett's test, communalities, total variance explained and regression analysis have been conducted by SPSS version 26.

From a total of 201 respondents 54.2% were female and 45.8% were male student. From a total of 201 respondents 80.60% were undergraduate student and 19.40% were post graduate student. Few of the questionnaire items which seems significant to delineate the respondent's overview of this topic are shown in the following graphical representation.

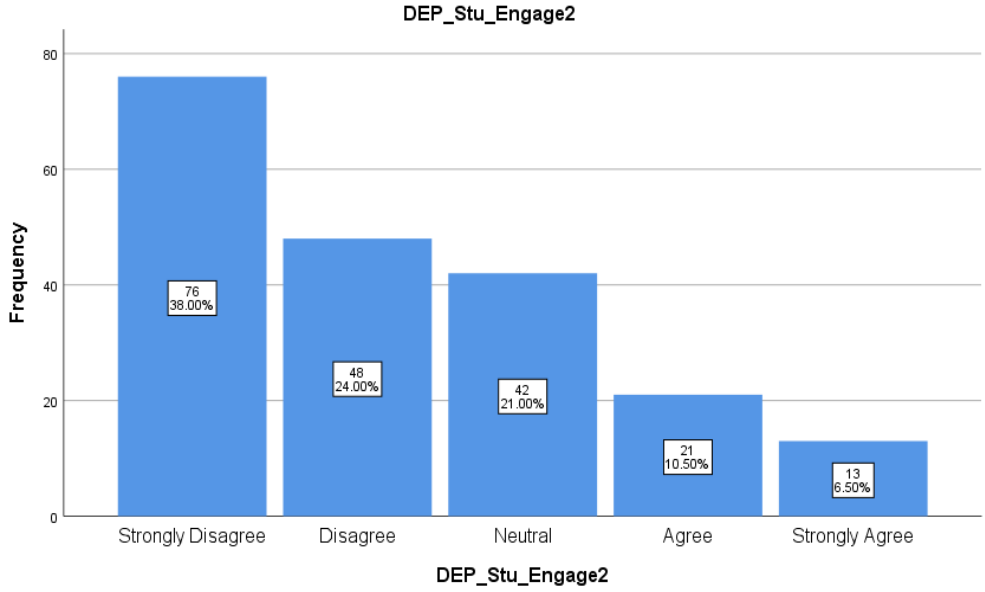

Figure 2. Degree of Preference and Motivation of Online Learning than Conventional Offline Learning

From Figure 2, the item was online learning is more motivating than conventional learning. And 38% students strongly disagreed with this statement. They highly feel that conventional/ traditional learning is more comfortable and motivating for them and they prefer it rather than online learning. Engagement can be better with conventional learning.

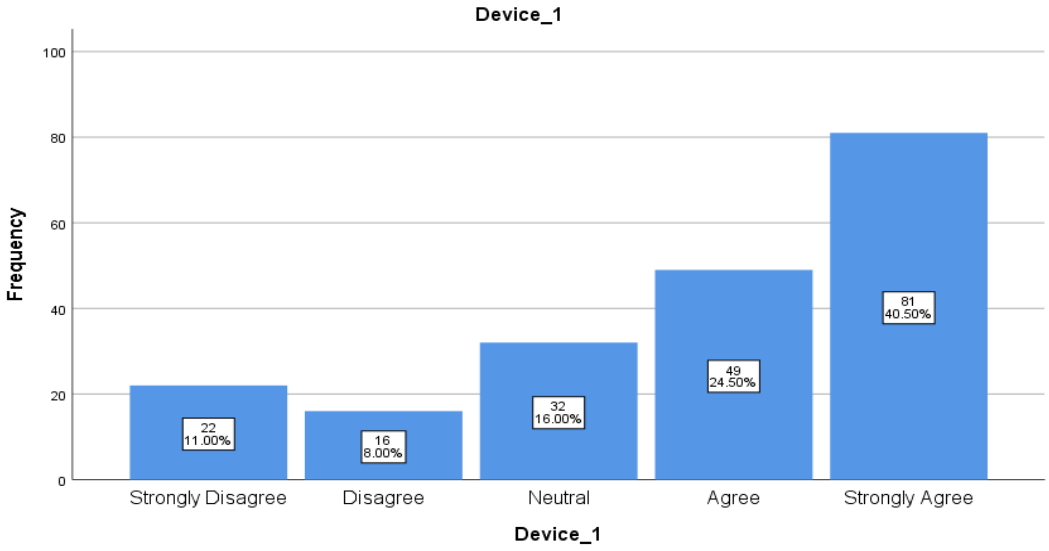

Figure 3. Buying Devices and Gadgets for Attending Online Classes and Exams

From Figure 3, for attending online classes, the item was whether anyone had to by any devices at home. The respondent's answers are 40.50% strongly agree. As they had to buy any sort of devices/ gadgets of attend exams and courses regularly remotely. For attending online classes

sometimes having a mere cell phone isn't enough. It's expected to buy another gadget for smooth study and class engagement and to attend regular classes.

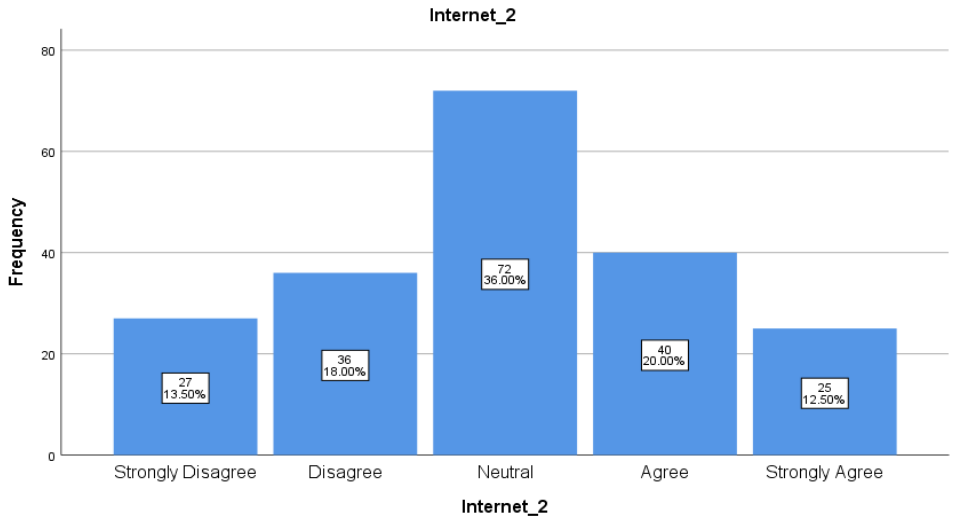

Figure 4. Internet Connection Speed and Reliability during Online Classes and Exams

From Figure 4, one of the items was the internet, students are using its speed and reliability. 36% of students responded neutral speed of their internet services. Perhaps the speed and connectivity of reliable internet network services are moderate to use regularly hence the response is neutral. Disconnection of internet is a common issue in attending online classes.

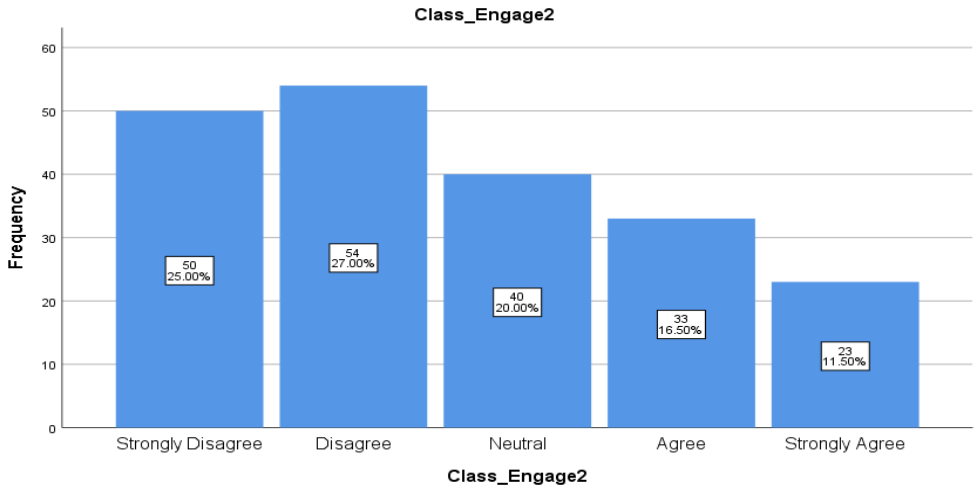

Figure 5. Engagement with Classmates during Online Classes

Figure 5 depicts that while online classes the engagement with other classmates if it's easy or not with five points Likert scale. Responses are 27% students disagreed with this statement. It illustrates that getting or providing help in the classes while it's online it's kind of tough. Getting engaged in any sort of group presentation and projects are pretty difficult. In fact, doing group study which is a significant factor for university students that's become a problem perhaps for this reason the response rate is mostly disagreed.

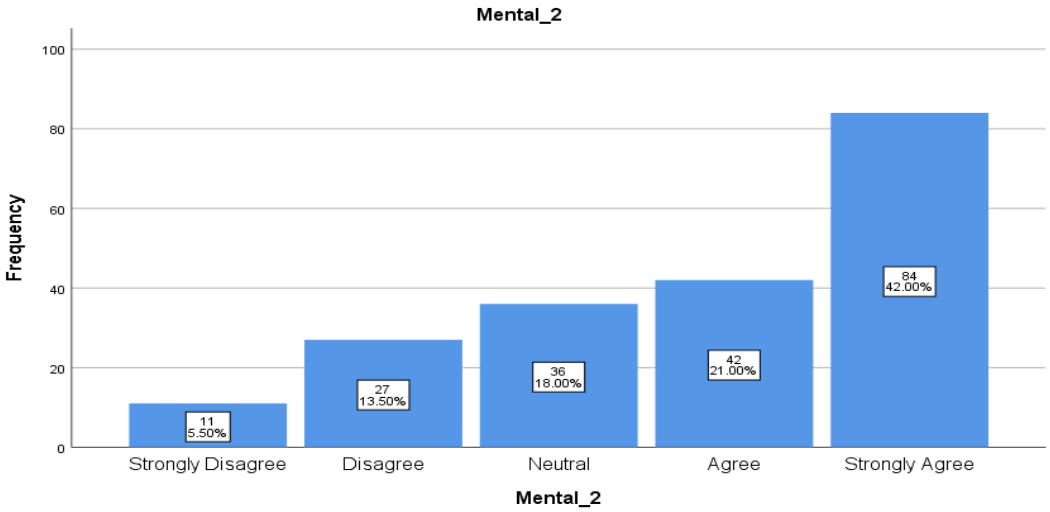

Figure 6. Online Classes and Giving Exams are Frustrating

From Figure 6, the item attending classes and giving exams online if it is frustrating or not 42% students strongly agreed with this statement. In online classes students can barely present themselves and share their feeling or queries. Sometimes network is an issue for attending classes and giving exams. Dysconnectivity of internet is a high problem for a students of university level for giving exams online. Therefore, they can't do well in the exams nor they get to be present regularly in the classes, hence it is a frustration for them.

4.1 Descriptive Analysis (Major Variables)

If the value of mean fall between 1.81 – 2.60 then the level will be low. Also, if the mean value fall between 2.61 – 3.40 the level will be average or moderate and 3.41 – 4.20 range value delineates good score (Firmansyah et al., 2018). To answer the second research objective, from Table 1, it can be said after the analysis that the engagement level of students is comparatively low which is 2.078. From Table 1, among all variables, three variables have a mean score at the good level, which is necessary device, reliable internet services and mental health issues. This indicates that the necessary device, reliable internet services and mental health issues have moderately influenced the students' engagement. Also, moderate or average influence is shown by class engagement. From the above graphical representation and description of some important items, it can be said that owing to many reasons regarding financial issue, internet, frustration and online engagement issues the engagement is poor for the university level students.

Table 1 Descriptive Analysis (Major Variables)

Descriptive Statistics			
	Mean	Std. Deviation	N
Student Engagement	2.078	1.0787	200
Device/Gadget	3.880	.7540	200
Internet	3.413	.9535	200
Class Engagement	2.743	1.1112	200
Mental Health	3.560	.7342	200

4.2 Correlation

Correlation analysis is a function to give a keen understanding of the relationship among variables and the correlation coefficient values were disclose the strength of the relationship. Hair et al. (2010) indicated that the values of the correlation should not be more than 0.90 because it will lead to a multicollinearity problem. Table 2 demonstrated the result of the overall values of the correlation among all variables values highest range is 0.575 which indicating moderate associations between these variables. It shows that all independent variables were significantly correlated and do lead to each other.

Table 2 Correlation Analysis

Correlations						
		Student Engage	Device/ Gadget	Internet	Class Engagement	Mental Health
Student Engage	Pearson Correlation	1				
Device/Gadget	Pearson Correlation	-.282**	1			
Internet	Pearson Correlation	.365**	-.082	1		
Class Engagement	Pearson Correlation	.575**	-.098	.557**	1	
Mental Health	Pearson Correlation	-.222**	.105	.047	-.049	1

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

4.3 Factor Analysis

Testing the suitability of the sample responders is crucial. The KMO's and Bartlett's test can be used to determine whether the sample size is adequate. The sample respondents' acceptability is demonstrated using KMO's and Bartlett's test. The tests determine whether or not the overall sample size is enough for the investigation. Each test has a benchmark value that should be compared to the actual value in order to determine the level of adequacy for the number of respondents.

Table 3 KMO's and Bartlett's Test

KMO's and Bartlett's Test		
KMO's Measure of Sampling Adequacy		.862
Bartlett's Test of Sphericity	Approx. Chi-Square	1162.836
	Df	78
	Sig.	.000

Kaiser, Meyer, and Olkin (KMO) developed the KMO scale to assess sampling adequacy. It possesses a standard value which is 0.70. The number of participants is adequate for the investigation if the value is higher than 0.70. Overall KMO values ≥.70 are desired but values less than 0.50 are generally considered unacceptable (Hair et al., 2010; Kaiser, 1974) Another indicator of a sufficient sample size is the significance level of the responders as shown by Bartlett's test. Null hypotheses will be accepted in Bartlett's test if the significance value is larger

than the benchmark value of 0.05. If it is less than 0.05, null hypotheses will be rejected (Jones, 1994).

The number of respondents for this study is sufficient per the KMO criterion of sampling adequacy because the value is 0.862, which is higher than the benchmark value of 0.70. The Bartlett's test results indicate that the significance level is 0.000, which is lower than the benchmark value of.05. The null hypothesis is thereby disproved, and the alternative hypothesis is accepted. The results of the tests indicated above indicate that the respondents' group is sufficient for further study.

4.4 Communalities

It is possible to determine which questions and items are relevant to this study and which ones are not through the use of the communalities Table 4.

Table 4 Communalities

Communalities		
	Initial	Extraction
Stu_Engage1	1.000	.526
Stu_Engage2	1.000	.686
Device_1	1.000	.326
Device_2	1.000	.489
Internet_1	1.000	.602
Internet_2	1.000	.644
Internet_3	1.000	.562
Class_Engage1	1.000	.720
Class_Engage2	1.000	.774
Class_Engage3	1.000	.543
Mental_1	1.000	.680
Mental_2	1.000	.790
Mental_3	1.000	.776
Extraction Method: Principal Component Analysis.		

The communalities above 0.4 is acceptable (Osborne, 2010).

There is just one value that is smaller than 0.4, as can be seen from the communalities table in this case. Therefore, it can be said that the study's questions are appropriate.

4.5 Total Variance Explained

The data categorisation and questionnaire integrity explanation table, or Total Variance Explained.

Table 5 Total Variance Explained

Total Variance Explained									
	Initial Eigenvalue			Extraction Sum of Squared Loading			Rotation Sum of Squared Loading		
Components	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.412	41.630	41.630	5.412	41.630	41.630	3.284	25.262	25.262
2	1.599	12.303	53.933	1.599	12.303	53.933	2.740	21.080	46.342
3	1.108	8.519	62.452	1.108	8.519	62.452	2.094	16.109	62.452
4	.888	6.832	69.284						
5	.777	5.974	75.258						
6	.731	5.624	80.882						
7	.551	4.235	85.117						
8	.459	3.530	88.647						
9	.374	2.874	91.521						
10	.343	2.639	94.160						
11	.286	2.198	96.358						
12	.261	2.006	98.364						
13	.213	1.636	100.000						

Extraction Method: Principal Component Analysis.

The independent factors have successfully explained the dependent variable if the cumulative percentage is 60% or above (Hair et al., 2010). The dependent's 62.452% variance is calculated from here. This surpasses the benchmark in quality. Accordingly, independent variables in this study undoubtedly adequately described the dependent variables.

4.6 Multiple Regression Analysis

Regression analysis is a set of statistical methods used to estimate relationships between a dependent variable and one or more independent variables. To determine the research objective one which is to identify the impact of the factors technological and social on students' engagement on students online learning multiple regression analysis was used.

Table 6 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.645[a]	.415	.404	.8331

The model summary in Table 6 provides details on how well a regression line can capture all of the variation in the dependant variable. It refers to whether or not the independent variables may evaluate the dependent variable. R, R Square, adjusted R Square, and Std make up the model

summary. The R-square (R^2) from the results of regression analysis explained whether to accept or to reject the hypotheses stated in this study. Table 7 showed that the result of R-square discloses that the variables necessary device, access to high-speed internet, mental health issues and class engagement account for 41.5% of the variation in students' engagement in online learning environment. It means that another 58.5% of the variance can be explained by other variables that were not included in this study. The four variables here those explain that the variables used in this study are enough to explain the students' online engagement scenario also there are other variables that explain the relationship with students' engagement those are not included in this study. But these four variables are also enough to explain this study. A value of 0.3 to 0.5 has a moderate/average effect on the dependent variables (Srinivasan, 2020). Hence, 40% is good enough to explain the relationship for this study.

4.6.1 Coefficients

The coefficient, which denotes the precise link between the independent factors and dependent variables, is shown in Table 7. It correctly describes the degree to which a single element can have an impact on dependable variable.

Table 7 Multiple Regression Analysis

Coefficients					
Variables	B	Std. Error	Beta		
(Constant)	2.532	.466		5.439	.000
Device	-.297	.079	-.208	-3.751	.000
Internet	.086	.075	.076	1.144	.254
ClassEnga	.489	.064	.504	7.593	.000
Mental	-.263	.081	-.179	-3.233	.001

Based on the result the students' engagement level is still low in the context of online learning environment. Multiple regression analyses were applied to investigate the influence of independent variables. The results indicated that necessary device and gadget issues, engagement in classes and mental health issues have a positive impact on digital marketing adoption and only one variable (access to high/reliable speed internet) was found not significant. The results of the hypotheses testing were shown in Table 8. Beta values for two variables presented a negative value. One is device issue and another one is mental health issues. Thus, it means there's a contradictory relationship with the device and mental health variables with the dependent variable students' engagement.

Table 8 Summary of Findings for Hypotheses Testing

	Hypotheses	**Supported/Not Supported**
Hypothesis 1	Necessary device and gadget issues influence students' engagement.	Supported
Hypothesis 2	Access to high speed and reliable internet network service influences students' engagement.	Not Supported
Hypothesis 3	Engagement in classes influences students' engagement.	Supported
Hypothesis 4	Mental health issues influence students' engagement.	Supported

5. DISCUSSIONS

According to the study's findings, it can be said that the impact of online learning depends upon how students perceived it and how they are engaged with it. It's believed that, during a pandemic, internet education was particularly beneficial. This study not only shows that online learning is needful but also that technological and social factors like student involvement in classes, mental health issues and essential device concerns all affect it. To answer the first objective of this study and based on the above result necessary device issue, participation in classes and mental health issues affect students' engagement in online learning. These variables are significant and influence online learning on university level students' engagement.

Students basically need mostly laptop, tab and mobile phone to attend classes, participation and for giving exams. This is an important issue for university level online learning for a student and without these gadgets online learning is not possible. Many students didn't have particular device for this that's why their family had to buy them a specific gadget for their learning. If the necessity of buying or having several devices increases that time students' engagement decrease. Even though during COVID-19 had the maximum number of online classes in Bangladesh. As a result, COVID-19 delayed many students' graduation, many people have lost their part-time/full-time jobs, and many people faced financial difficulties. This finding is consistent with research of (Tamrat, 2021; Noori, 2021). The participants believed that purchasing devices for online classes would be expensive, and that most Internet bundles would be prohibitively expensive during COVID-19. Inadequate technological device facilities and financial issues hampered their learning experience during the COVID-19 pandemic. Many students were unable to purchase a smartphone/smart device in 2020 due to financial constraints, and their learning outcomes suffered as a result. Therefore, this finding is contradicting with the theory of SDT because students are less motivated due to devices issues to participate or engage in the online classes.
Class participation is significant and creates a positive impact because group projects, assignments, presentations and other activities are there. In online classes since students cannot see themselves or cannot meet themselves, they cannot have proper discussion and learning together and with each other. Understanding and friendship is barely happened in this scenario. So, their group study, learning projects and other assignments may hamper due to lack of proper relationship. Not only for class works or assignments, having friends and having a good relationship with each other is equally important as a university student. Networking is a big issue for them for any further activities and programs. In online learning for university students both undergrad and post grad level this creates a gap regarding doing this type of activities and networking.

In addition to that as this is not a conventional or traditional learning, students' mentality may differ and some may not concentrate or do well in the online classes as well as in exams. It creates an instability in their mental health and can't do their studies properly. Attending classes from cannot be comfortable for someone. A student may have bad background, or family problem or not having proper space for attending classes with videos or not having proper place and quite situation to give exams peacefully. Their financial condition may vary. In some level some students get dropped out from university for doing bad results due to mental health issues. Same goes for mental health issues. If mental health issues increase that time students' engagement reduces in their classes and studies during online learning. With online studies, the home transitioned from a place of relaxation to a place of learning. It was difficult for university students to adopt a new perspective. Students found the residences to be distracting due to the presence of social media, television, and other family members. Giving concentration was difficult for them in their new study environment (Alam, 2022). Online studies caused changes in their educational schedules, resulting in a change in routine. Students are staying awake late and waking up at all hours, and some have insomnia. The transformation in sleeping habits impacted sleep quality, likely to result in poor physical and mental health. The video calls demand a lot of cognitive and emotional energy, which leads to exhaustion (Williams, 2021). Some people reported difficulty reading and absorbing information from e-lectures. Such students were concerned about their academic performance, and they did not believe that the circumstances allowed them to focus properly in class. As a result, some students experienced emotional or psychological distress. As a result, the increasing prevalence of mental health issues reduces student engagement in online learning. Therefore, this finding is contradicting with the SDT theory because students are demotivated or less determined to attend online classes and their engagement in classes are low owing to the different mental health issues.

On the other hand, access to high-speed internet and network services are insignificant and does not influence students' engagement according to hypothesis test results. The reason might be, now there are lots of options data connection, mobile network, modem and WIFI. So multiple options are there to continue online learning, classes and exams if one network get lost, they might take help and opportunity from another. Though it is expensive but attainable can be used at a time when it is needed.

To respond for the second objective, the students' engagement level is low during online learning. Because in online courses they are unable to provide their full attention because mostly they remain at home. Most of them may not have a proper environment to continue online courses or can be distractive. In addition to that, device issues, mental health also play crucial roles for the low engagement. Students cannot have a proper participation in the online classes or he/she may have understanding issues. In traditional face to face classes students regular go to classes on time, attends the lectures, mix with many students, can involve in group projects and participate more vibrantly and actively, also their mentality becomes better because at least they can share their problems or any issues with others. But in online classes since it is conducted remotely so it is difficult for a student to manage so many social and technical issues all together to concentrate on the classes with proper engagement. So, owing to many reasons students engagement level is low in the online learning environment.

6. CONCLUSIONS

This study has important implications both theoretically and practically. After the complete discussion it can be understood that both technological and social factors basically affect students online learning environments. But in technological factors necessary device and gadget issue influence online learning also the social factors class engagement and mental health issues influence students' engagement in online learning. Compared to asynchronous or face-to-face courses, the discussion should be properly structured and planned for a shorter duration with

simpler tasks in online courses. Because it established the complete path from learning climate, need satisfaction, and motivation to learning outcomes, the result was a breakthrough for extending the application of the SDT model into online learning environments. In different words, addressing the three fundamental needs identified by SDT can enhance student performance in online learning settings. This finding should prompt academics and professionals to reevaluate how students and teachers function in virtual classrooms. This study refocuses the discussion on the significance of an autonomy supportive learning environment for student achievement in virtual learning environments. Previous research has linked successful learning outcomes to online students' ability to control their own learning. Through the creation of online learning platforms that can inspire students using the SDT framework, the current study highlights the significance and effects of fundamental technological and social factors as well as self-determined motivation.

The contribution of this study towards the practical and theoretical context is huge. From this study academicians, university authority and teachers can learn and understand about the students' problems based on variables that may affect their engagement in online classes. By knowing this they might take necessary actions to resolve the matter or to take some steps regarding this to increase the engagement. On the other hand, theoretical contribution is there as using this theory in the context of Bangladesh for students' engagement is new. So, researchers also can gain idea from this overview. Therefore, this study will enhance the knowledge towards the empirical research arena as well as to the practical scenario. Understanding the factors that support students' engagement in online learning settings is crucial. Since online learning uses a unique platform, university-level students' involvement and engagement can vary. The factors that affect students' participation must be examined for their development and well-being so that authorities can focus more on them to improve the process. Using the SDT, this paper attempted to highlight these influences on students' participation. This study with the theory's relationship has not been investigated before in the context of Bangladesh, and it will undoubtedly help us better understand student involvement and the actions the university authority should do to improve and for the betterment.

7. RECOMMENDATIONS

Lecturers should encourage students to share their experiences with these services by outlining student supportive services to the class. Follow up with absentees and "silent" responses to inquire about their access to technology and general well-being, keeping in mind that some adult learners might want to take a more passive role in the process. Use educational technology that enables anonymous involvement, such as polls and whiteboards. Be "present" in class via video, and think about using student footage for various segments (Irawan et al., 2020). Recognise the difficulties some students have had adjusting to the required switch to online instruction (or other relevant shared issue). With students, discuss the own problems and pertinent experiences and urge them to do the same. Together with the students, establish ground rules for class debates and have a strategy in place for handling inappropriate topics. Encourage students to express their feelings with emoticons in text chat and in text responses to classwork exercises (Fauzi & Sastra Khusuma, 2020).

This study has the ability to educate educators on tactics that might be used to create effective student engagement in online education and to highlight valuable practices for the betterment of them for higher education institutions. The development of a relationship between the SDT and the preexisting variables during online delivery, which can increase students' engagement in business education, is discussed in this unique paper that contributes to the exchange of ideas with the academic community and educational authority as well as teachers and instructors. Future researchers could investigate this subject by using a more exacting data analysis technique, including more people and contrasting a wider range of variables.

REFERENCES

Afroze, R., & Shafi, S. (2021). Adoption of Digital Marketing in E-Recruitment Success: A Quantitative Study on Bangladesh Perspective. *Journal of Management Research*, *13*(4), 20. https://doi.org/10.5296/jmr.v13i4.18988

Ahmed, F., & Sifat, R. I. (2021). Strategic Assessment of Mental Health and Suicide Amid COVID-19 Pandemic in Bangladesh. *The International Journal of Health Planning and Management*, *36*(3), 980–985. https://doi.org/10.1002/hpm.3121

Al-Tammemi, A. B., Akour, A., & Alfalah, L. (2020). Is It Just About Physical Health? An Online Cross-Sectional Study Exploring the Psychological Distress Among University Students in Jordan in the midst of COVID-19 Pandemic. *Frontiers*. https://doi.org/10.1101/2020.05.14.20102343

Alam, M. (2022). Mental Health Impact of Online Learning: A Look into University Students in Brunei Darussalam. *Asian Journal of Psychiatry*, *67*, 102933. https://doi.org/10.1016/j.ajp.2021.102933

Aldhafeeri, F. M., & Alotaibi, A. A. (2022). Effectiveness of Digital Education Shifting Model on High School Students' Engagement. *Education and Information Technologies*, *27*(5), 6869–6891. https://doi.org/10.1007/s10639-021-10879-4

Alsoud, A. R., & Harasis, A. A. (2021). The Impact Of COVID-19 Pandemic on Student's E-Learning Experience in Jordan. *Journal of Theoretical and Applied Electronic Commerce Research*, *16*(5), 1404–1414. https://doi.org/10.3390/jtaer16050079

Andrade, C. (2020). The Inconvenient Truth About Convenience and Purposive Samples. *Indian Journal of Psychological Medicine*, *43*(1), 86–88. https://doi.org/10.1177/0253717620977000

Bedenlier, S., Bond, M., Buntins, K., Zawacki-Richter, O., & Kerres, M. (2020). Facilitating Student Engagement Through Educational Technology in Higher Education: A Systematic Review in The Field of Arts And Humanities. *Australasian Journal of Educational Technology*, 126–150. https://doi.org/10.14742/ajet.5477

Bond, M. (2020). Facilitating Student Engagement Through the Flipped Learning Approach In K-12: A Systematic Review. *Computers & Education*, *151*, 103819. https://doi.org/10.1016/j.compedu.2020.103819

Bower, M., Lee, M. J. W., & Dalgarno, B. (2016). Collaborative Learning Across Physical and Virtual Worlds: Factors Supporting and Constraining Learners in A Blended Reality Environment. *British Journal of Educational Technology*, *48*(2), 407–430. https://doi.org/10.1111/bjet.12435

Buzinde, C. N. (2020). Theoretical Linkages Between Well-Being and Tourism: The Case of Self-Determination Theory and Spiritual Tourism. *Annals of Tourism Research*, *83*, 102920. https://doi.org/10.1016/j.annals.2020.102920

Carey, K. (2020, March 13). Everybody Ready for the Big Migration to Online College? Actually, No. *The New York Times*. https://www.nytimes.com/2020/03/13/upshot/coronavirus-online-college-classes-unprepared.html

Cauchemez, S., Van Kerkhove, M. D., Archer, B. N., Cetron, M., Cowling, B. J., Grove, P., & Oshitani, H. (2014). School Closures During The 2009 Influenza Pandemic: National and Local Experiences. BMC *Infectious Diseases, 14*(1), 207.

Check, J., & Schutt, R. K. (2012). Research Methods in Education. *SAGE*. https://doi.org/10.4135/9781544307725

Chiu, T. K. F. (2021). Applying the Self-Determination Theory to Explain Student Engagement In Online Learning During the COVID-19 Pandemic. *Journal of Research on Technology in Education*, *54*(sup1), S14–S30. https://doi.org/10.1080/15391523.2021.1891998

Chiu, T. K., & Mok, I. A. (2017). Learner Expertise and Mathematics Different Order Thinking Skills in Multimedia Learning. *Computers & Education*, *107*, 147–164. https://doi.org/10.1016/j.compedu.2017.01.008

Christenson, S. L., Reschly, A. L., & Wylie, C. (2012). Handbook of Research on Student Engagement (2012th ed.). *Springer*.

Deci, E. L., & Ryan, R. M. (2008). Self-Determination Theory: A Macro Theory of Human Motivation, Development, and Health. *Canadian Psychology / Psychologie Canadienne*, *49*(3), 182–185. https://doi.org/10.1037/a0012801

Dhawan, S. (2020). Online Learning: A Panacea in the Time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Dixson, M. D. (2015). Measuring Student Engagement in the Online Course: The Online Student Engagement Scale (OSE). *Online Learning*, *19*(4). https://doi.org/10.24059/olj.v19i4.561

Dutta, S., & Smita, M. K. (2020). The Impact Of COVID-19 Pandemic on Tertiary Education in Bangladesh: Students' Perspectives. *Open Journal of Social Sciences, 8*, 53-68 https://doi.org/10.4236/jss.2020.89004

Ela, M. Z., Shohel, T. A., Shovo, T. E. A., Khan, L., Jahan, N., Hossain, M. T., & Islam, M. N. (2021). Prolonged Lockdown and Academic Uncertainties in Bangladesh: A Qualitative Investigation During the COVID-19 Pandemic. *Heliyon*, *7*(2), e06263. https://doi.org/10.1016/j.heliyon.2021.e06263

Elshami, W., Taha, M. H., Abdalla, M. E., Abuzaid, M., Saravanan, C., & Al Kawas, S. (2022). Factors That Affect Student Engagement in Online Learning in Health Professions Education. *Nurse Education Today*, *110*, 105261. https://doi.org/10.1016/j.nedt.2021.105261

Fauzi, I., & Sastra Khusuma, I. H. (2020). Teachers' Elementary School in Online Learning of COVID-19 Pandemic Conditions. *Jurnal Iqra': Kajian Ilmu Pendidikan*, *5*(1), 58–70. https://doi.org/10.25217/ji.v5i1.914

Favale, T., Soro, F., Trevisan, M., Drago, I., & Mellia, M. (2020). Campus Traffic And E-Learning During COVID-19 Pandemic. *Computer Networks*, *176*, 107290. https://doi.org/10.1016/j.comnet.2020.107290

Firmansyah, Soeriaatmadja, A., & Wulanningsih, R. (2018, October 17). A Set of Sustainable Urban Landscape Indicators and Parameters to Evaluate Urban Green Open Space in Bandung City. *IOP Conference Series: Earth and Environmental Science,* 179, 012016. https://doi.org/10.1088/1755-1315/179/1/012016

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate Data Analysis. Prentice Hall.

Irawan, A. W., Dwisona, D., & Lestari, M. (2020). Psychological Impacts of Students on Online Learning During the Pandemic COVID-19. *KONSELI: Jurnal Bimbingan Dan Konseling (E-Journal)*, *7*(1), 53–60. https://doi.org/10.24042/kons.v7i1.6389

Islam, S., Akter, R., Sikder, T., & Griffiths, M. D. (2020). Prevalence and Factors Associated with Depression and Anxiety Among First-Year University Students in Bangladesh: A Cross-Sectional Study. *International Journal of Mental Health and Addiction*, *20*(3), 1289–1302. https://doi.org/10.1007/s11469-020-00242-y

Jang, H., Kim, E. J., & Reeve, J. (2016). Why Students Become More Engaged or More Disengaged During the Semester: A Self-Determination Theory Dual-Process Model. *Learning and Instruction*, *43*, 27–38. https://doi.org/10.1016/j.learninstruc.2016.01.002

Jeno, L. M., Grytnes, J. A., & Vandvik, V. (2017). The Effect of a Mobile-Application Tool on Biology Students' Motivation and Achievement in Species Identification: A self-determination theory perspective. *Computers & Education*, *107*, 1–12.
https://doi.org/10.1016/j.compedu.2016.12.011

Jones, D. H. (1994). Book Review: Statistical Methods, 8th Edition George W. Snedecor and William G. Cochran Ames: Iowa State University Press, 1989. xix + 491 pp. *Journal of Educational Statistics*, *19*(3), 304–307. https://doi.org/10.3102/10769986019003304

Kaiser, H. F. (1974). An Index of Factorial Simplicity. *Psychometrika*, 39(1), 31–36. https://doi.org/10.1007/bf02291575

Kaur, G. (2020). Digital Life: Boon or Bane in Teaching Sector on COVID-19. *CLIO An Annual Interdisciplinary Journal of History, 6*(6), 416-427.

Keeton, M. T. (2019). Best Online Instructional Practices: Report of Phase I of An Ongoing Study. *Online Learning*, *8*(2). https://doi.org/10.24059/olj.v8i2.1829

Kim, K. J., Liu, S., & Bonk, C. J. (2005). Online MBA Students' Perceptions of Online Learning: Benefits, Challenges, and Suggestions. *The Internet and Higher Education*, *8*(4), 335–344. https://doi.org/10.1016/j.iheduc.2005.09.005

Liguori, E., & Winkler, C. (2020). From Offline to Online: Challenges and Opportunities for Entrepreneurship Education Following the COVID-19 Pandemic.

Lim, D. H. (2004). Cross Cultural Differences in Online Learning Motivation. *Educational Media International*, *41*(2), 163–175. https://doi.org/10.1080/09523980410001685784

Mark, G., & Semaan, B. (2008). Resilience in Collaboration. *Proceedings of the ACM 2008 Conference on Computer Supported Cooperative Work - CSCW '08*. https://doi.org/10.1145/1460563.1460585

Martin, F., & Bolliger, D. U. (2018). Engagement Matters: Student Perceptions on the Importance of Engagement Strategies in the Online Learning Environment. *Online Learning*, *22*(1). https://doi.org/10.24059/olj.v22i1.1092

Meo, S. A., Abukhalaf, D. A. A., Alomar, A. A., Sattar, K., & Klonoff, D. C. (2020). COVID-19 Pandemic: Impact of Quarantine on Medical Students' Mental Wellbeing and Learning Behaviors. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4). https://doi.org/10.12669/pjms.36.covid19-s4.2809

Miller, K. A., Deci, E. L., & Ryan, R. M. (1988). Intrinsic Motivation and Self-Determination in Human Behavior. *Contemporary Sociology*, *17*(2), 253. https://doi.org/10.2307/2070638

Van, N. T., Irum, S., Alhamzah F. A., Sikandar, H., & Khan, N. (2022). Online Learning: Two Side Arguments Related to Mental Health. *International Journal of Online and Biomedical Engineering (IJOE)*, *18*(09), 131–143. https://doi.org/10.3991/ijoe.v18i09.32317

Nitu, S. F. F., Rahman, A. A., & Haque, M. N. (2020). COVID-19 scenario and possible crisis management plan in Bangladesh: A review. *Journal of Engineering Science*, *11*(2), 45–60. https://doi.org/10.3329/jes.v11i2.50897

Noori, A. Q. (2021). The Impact Of COVID-19 Pandemic on Students' Learning in Higher Education in Afghanistan. *Heliyon*, *7*(10), e08113. https://doi.org/10.1016/j.heliyon.2021.e08113

Núñez, J. L., & León, J. (2015). Autonomy Support in the Classroom. *European Psychologist*, *20*(4), 275–283. https://doi.org/10.1027/1016-9040/a000234

Osborne, J. W. (2010). Data Cleaning Basics: Best Practices in Dealing with Extreme Scores. *Newborn and Infant Nursing Reviews, 10*(1), 37–43. https://doi.org/10.1053/j.nainr.2009.12.009

Owusu-Fordjour, C., Azure, J. A., & Koomson, C. K. (2021). Integrated Science Teachers' Self-Efficacy Beliefs and Its Impact on Their Instructional Practice. *European Journal of Open Education and E-Learning Studies*, *6*(2). https://doi.org/10.46827/ejoe.v6i2.3922

Partlow, K. M., & Gibbs, W. J. (2003). Indicators of Constructivist Principles in Internet-Based Courses. *Journal of Computing in Higher Education*, *14*(2), 68–97. https://doi.org/10.1007/bf02940939

Pham, L. T., & Dau, T. K. T. (2022). Online Learning Readiness and Online Learning System Success in Vietnamese Higher Education. *The International Journal of Information and Learning Technology*, *39*(2), 147–165. https://doi.org/10.1108/ijilt-03-2021-0044

Reeve, J., & Tseng, C. M. (2011). Agency as a Fourth Aspect of Students' Engagement During Learning Activities. *Contemporary Educational Psychology*, *36*(4), 257–267. https://doi.org/10.1016/j.cedpsych.2011.05.002

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and Extrinsic Motivation from A Self-Determination Theory Perspective: Definitions, Theory, Practices, And Future Directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Saha, A., Dutta, A., & Sifat, R. I. (2021). The Mental Impact of Digital Divide Due to COVID-19 Pandemic Induced Emergency Online Learning at Undergraduate Level: Evidence from Undergraduate Students from Dhaka City. *Journal of Affective Disorders*, *294*, 170–179. https://doi.org/10.1016/j.jad.2021.07.045

Saunders, M. L. P. T. A. N. K. (2022). Research Methods for Business Students. *PEARSON*.

Schumacher, C., & Ifenthaler, D. (2021). Investigating Prompts for Supporting Students' Self-Regulation: A Remaining Challenge for Learning Analytics Approaches? *The Internet and Higher Education*, *49*, 100791. https://doi.org/10.1016/j.iheduc.2020.100791

Scott, J. (2017). Social Network Analysis. *Sage*. https://doi.org/10.4135/9781529716597

Selwyn, N. (2016). Minding Our Language: Why Education and Technology is Full of Bullshit and What Might Be Done About It. *Learning, Media and Technology, 41*(3), 437–443. https://doi.org/10.1080/17439884.2015.1012523

Serafini, G., Parmigiani, B., Amerio, A., Aguglia, A., Sher, L., & Amore, M. (2020). The Psychological Impact Of COVID-19 on the Mental Health in the General Population. *QJM: An International Journal of Medicine*, *113*(8), 531–537. https://doi.org/10.1093/qjmed/hcaa201

Shafi, S., Salleh, H. S., & Mohamed, W. N. (2022). Digital Marketing Innovation in Managerial Practices: A Systematic Literature Review. *Corporate Governance and Organizational Behavior Review*, *6*(4), 64-79. https://doi.org/10.22495/cgobrv6i4p6

Singh, V., & Thurman, A. (2019). How Many Ways Can We Define Online Learning? A Systematic Literature Review of Definitions of Online Learning (1988–2018). *American Journal of Distance Education*, *33*(4), 289–306. https://doi.org/10.1080/08923647.2019.1663082

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and Disaffection in the Classroom: Part of a Larger Motivational Dynamic? *Journal of Educational Psychology*, *100*(4), 765–781. https://doi.org/10.1037/a0012840

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving Online Learning: Student Perceptions of Useful and Challenging Characteristics. *The Internet and Higher Education*, *7*(1), 59–70. https://doi.org/10.1016/j.iheduc.2003.11.003

Srinivasan, P. (2020, November 30). Interpreting P-Value And R-Squared Score on Real-Time Data–Statistical. Data Exploration. Analytics Vidhya. https://www.analyticsvidhya.com/blog/2020/11/interpreting-p-value-and-r-squared score-on-real-time-data-statistical-data-exploration/

Szopiński T, Bachnik K. Student Evaluation of Online Learning During the COVID-19 Pandemic. *Technol Forecast Soc Change*. 2022. doi: 10.1016/j.techfore.2021.121203

Tamrat, W., (2021). Enduring the Impacts of COVID-19: Experiences of the Private Higher Education Sector in Ethiopia. *Stud. High Educ*. *46* (1), 59–74.

Trenshaw, K. F., Revelo, R. A., Earl, K. A., & Herman, G. L. (2016). Using Self-Determination Theory Principles to Promote Engineering Students' Intrinsic Motivation to Learn. *International Journal of Engineering Education, 32*(3), 1194–1207.

Trowler, V. (2010). Student Engagement Literature Review. The Higher Education Academy: Lancaster University. Retrieved from http://www.new2.heacademy.ac.uk/assets/documents/studentengagement/StudentEngagementLiteratureReview.pdf.

Tualaulelei, E., Burke, K., Fanshawe, M., & Cameron, C. (2021). Mapping Pedagogical Touchpoints: Exploring Online Student Engagement and Course Design. *Active Learning in Higher Education*, 146978742199084. https://doi.org/10.1177/1469787421990847

Walker, C. O., Greene, B. A., & Mansell, R. A. (2006). Identification with Academics, Intrinsic/Extrinsic Motivation, and Self-Efficacy as Predictors of Cognitive Engagement. *Learning and Individual Differences*, *16*(1), 1–12. https://doi.org/10.1016/j.lindif.2005.06.004

Wang, M. T., Fredricks, J., Ye, F., Hofkens, T., & Linn, J. S. (2019). Conceptualization and Assessment of Adolescents' Engagement and Disengagement in School. *European Journal of Psychological Assessment*, *35*(4), 592–606. https://doi.org/10.1027/1015-5759/a000431

Wang, Y., Cao, Y., Gong, S., Wang, Z., Li, N., & Ai, L. (2022). Interaction and Learning Engagement in Online Learning: The Mediating Roles of Online Learning Self-Efficacy and Academic Emotions. *Learning and Individual Differences*, *94*, 102128. https://doi.org/10.1016/j.lindif.2022.102128

Williams, N. (2021). Working through COVID-19: 'Zoom' Gloom and 'Zoom' Fatigue. *Occupational Medicine*, *71*(3), 164–164. https://doi.org/10.1093/occmed/kqab041