

# STUDENTS' ADOPTION OF GOOGLE CLASSROOM INVESTIGATED BY TECHNOLOGY ACCEPTANCE MODEL

Rajib Lochan Das 

*Educational institutions in Bangladesh had to stop face-to-face educational activities during the COVID-19 pandemic. Institutions accepted online classes as the only alternative for conducting educational activities. Teachers and students transitioned from face-to-face to online medium by using a Learning Management System (LMS). Google Classroom has evolved as an LMS during this period. This study uses a quantitative research methodology to focus on students' adoption of Google Classroom in higher education using the modified version of the Technology Acceptance Model (TAM). In particular, this research aims to identify the factors affecting university students' behavioural intention towards LMS. The revised LMS-TAM model was used with prediction factors like perceived usefulness, perceived ease of use, behavioural intent, enjoyment, subjective norm, satisfaction, and interactivity and control. A questionnaire was developed with experts' opinions and distributed online to the respondents. 185 university students from different disciplines gave responses to the questionnaire. A set of recommendations are formulated based on the statistical results. The researchers are hopeful that higher education institutions, teachers, technical support staff, instructional designers and policymakers will benefit from this study.*

**KEYWORDS:** COVID-19 Pandemic, Google Classroom, Online Class, Learning Management System, Teaching-Learning, Technology Acceptance Model

## INTRODUCTION

Integrating technology into education was intended to create a meaningful educational experience for better students' learning through a transformative

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process with the potential to increase performance (Goh et al., 2020). Old research of 700 empirical studies reviewed by Schacter (1999) showed that students with access to ICT in their schools were more engaged and more likely to achieve the expected learning outcomes compared with students who did not have access to ICT. This reality intensified since 11th March 2020 when the Director-General of The World Health Organization (WHO) declared the corona virus outbreak to be a pandemic (World Health Organization [WHO], 2020). Consequently, the deputy Education Minister of Bangladesh announced an initial closure of schools, colleges and universities in the country from 17-31 March (Sakib, 2020) which was later extended until September 2020. The closure was later extended several more times for different lengths of periods. Educational institutions in Bangladesh including universities had to abruptly switch teaching learning activities from face-to-face (F2F) to online classes. Most of the 350,000 students' at private universities started online classes as soon as they were closed for F2F classes (Jasim, 2020). Significance of using a technological platform for educational activities has been realised during this period of online teaching and learning. The Bangladesh government is also aware of the opportunities of using technology in education to enhance equity, quality, and efficiency and have heavily co-invested with aid agencies, private sector, and international and/or regional organizations (Asian Development Bank [ADB], 2017). The success in use or transformation of distance learning is dependent upon its capacity to appropriate alignment or co-opting any of the other trends in the educational technology spaces of practice and policy (Traxler, 2018). Here comes the importance of adoption of LMS by the practitioners of educational activities including the students. A proper utilization of an LMS may be successful in teaching and learning. On the contrary, an inappropriate implementation of such system may be problematic, often resulting in failure (Bhuasiri et al., 2012). Therefore, students' adoption level of using Google Classroom as an LMS in particular, needs to be investigated.

The overall objective of the study is to measure the students' adoption of Google Classroom as an LMS in the online study of higher education. The specific objectives include identification and measurements of the students' social influences in the adoption of LMS through a set of hypotheses by using a well accepted measuring model. The study was anticipated with reasonable findings so that the future implementation of LMS in higher education can be more effective to students' learning in online settings. Experience on particular Google Classroom may bring insights for adopting other popular LMS platforms.

This study was conducted in the context of higher education in Bangladesh.

The university students who used Google Classroom as an LMS were the respondents for studying their level of adoption by using a structured tool i.e., the technology acceptance model.

## LITERATURE REVIEW

Literature review section of this article summarises relevant texts on learning management system and the technology acceptance model in education and their dynamics connected to investigating students' adoption level.

Ra, Chin, and Lim (2016) introduced a holistic approach to ICT in education, which consists of 10 dimensions at the micro and macro levels of the national education system driving and supporting ICT in education. In the context of three South Asian countries including Bangladesh, the suggested model was modified with 7 dimensions (ADB, 2017): (i) national ICT in education vision, policies, and strategies, (ii) ICT infrastructure (information technology backbone and connectivity), (iii) professional development of teachers and education leaders, (iv) modernization of curriculum and teaching and learning resources, (v) improvements in learning environment, (vi) improvements in assessment and examination; and (vii) improvements in education management information system (EMIS), including evaluation and research to inform evidence-based planning and resource allocation. The latter three dimensions from (v) to (vii) directly influence the learning management system. An LMS (Learning Management System) can offer a blended environment of teaching-learning and several e-learning platforms have been popularized since the spread of COVID-19 (Dahiya & Malik, 2021).

The Learning Management System is an online program that serves as a learning and communication platform for students. Blackboard, Canvas, e-College, Moodle, and Sakai are examples of Learning Management Systems (Borboa et al., 2014). Many other LMS software applications are developed in recent years and available in different modes for every level of education around the world. Each has slightly different features and approaches of use for teachers and students. Use of a LMS can help make professors' and students' lives easier by creating an online class setting and the best quality among these systems is its ease of use (Green et al., 2006).

Google Classroom service was once a part of G Suite for Education, now renamed as Google Workspace for Education developed by the tech giant Google. In their own definition, Google Classroom is an all-in-one place for teaching and learning, which is easy-to-use and secure tool that helps educators manage, measure, and enrich learning experiences. Sudden increment in use of Google Classroom in education during the period of

COVID-19 pandemic compelled Google to improve its features for evolving into a complete LMS. Capabilities of Google Classroom include: (i) Streamline classroom management (ii) Grade efficiently (iii) Provide clear and rich feedback (iv) Support all types of learners (v) Help students stay organized (vi) Encourage critical thinking (vii) Make each lesson more personal (viii) Apply analytics to keep improving (ix) Stay flexible and scalable and (x) Stay secure and compliant (Google for Education, 2021). One of the recent studies done on Google Classroom for higher education setting found that the Google Classroom was generally very well received by the students amongst 91.7% of them rated the effectiveness of the tool, as it was used in the course as either good or very good, and 87.5% indicated that they would use it in their future classes if possible (Heggart & Yoo, 2018). Three fourth of the students in the same study mentioned that they are willing to use Google Classroom during seminars and also outside of the classroom. Another study on English learning of college students by using Google Classroom in Korea found that most of the students liked that they could easily submit their assignments from home, automatically receive email notifications, watch recorded video at any time through the circulated links, and track their submissions and instructor's feedback on real time (Lee & Cha, 2021).

### **Technology Acceptance Model**

Davis, in 1986, developed the model of technology adoption as a modified version of the Theory of Reasoned Action (TRA), which became popular as Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989). TAM has been used as a theoretical basis of investigating the acceptance of information technology in a formal setting including education. As the TAM proposed, technology use is determined by perceived usefulness, perceived ease-of-use and attitude (Davis et al., 1989). Determinants of perceived ease-of-use were identified as: integrating control, intrinsic motivation, and emotion into the TAM (Venkatesh, 2000).

In another article Venkatesh and Davis (2000) extended the TAM, referred as TAM 2, incorporating additional theoretical constructs spanning social influence processes and cognitive instrumental processes. TAM2 reflects the impact of three interrelated social forces impinging on an individual facing the opportunity to adopt or reject a new system: subjective norm, voluntariness, and image. On the other hand, the cognitive instrumental forces include: job relevance, output quality, result demonstrability, and perceived ease of use (Venkatesh & Davis, 2000). Further developments were made on the model in addition to the in-depth systematic review of literature by the experts from academia to assist in the improvements.

The model used in this article was proposed by Findik-Coskuncay et al. (2018) known as LMS-TAM. The constructs of this model are identified as: Perceived Usefulness (PU), Perceived Ease-of-Use (PEOU), Behavioural Intention (BI), Self-Efficacy (SE), Enjoyment (ENJ), Subjective Norm (SN), Satisfaction (STS), and Interactivity and Control (IC) (Findik-Coskuncay et al., 2018). After conducting the research and analysis of the findings, the researchers clustered the Self-Efficacy (SE) items under the Perceived Ease-of-Use (PEOU). Finally, the seven-point construct of the model (PU, PEOU, BI, ENJ, SN, STS and IC) is taken here as the theoretical base of this article by clustering SE items under the construct PEOU.

## RESEARCH METHODOLOGY

The methodology of the research is stated in following sections.

### Research Model

The structural research model LMS-TAM was used as the theoretical framework for investigating the students' adoption of Google Classroom as an LMS. The main aim of this model is to identify actual behaviour with behavioural intention of the students. Table 1 shows the definitions of the model constructs with references.

**Table 1**  
**Definitions of the Constructs in the LMS-TAM with References.**

Construct	Definition	Theory	Reference
PU	The degree to which a person believes that using a particular system would enhance his or her job performance	TAM	Davis, 1989
PEOU	The degree to which a person believes that using a particular system would be free of effort	TAM	Davis, 1989
SE*	The belief an individual has in his/her ability to successfully perform a certain behaviour	Social Cognitive Theory	Bandura, 1986
BI	An individual's performing a conscious act, such as deciding to accept (or use) a technology	TAM	Davis, 1989
ENJ	The extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use	Self-determination theory- Intrinsic Motivation	Venkatesh, 2000
SN	The social pressure from the social environment on the users to use a system	TRA	Ajzen, 1991
STS	The extent to which a user is pleased or contented with the information system	D&M Information Systems Success Model	Delone & McLean, 2003
IC	The system characteristics by which user could interact with each other and control the form and content of a mediated environment	LMS-TAM	Findik-Coskuncay et al., 2018

\*SE items were clustered under the PEOU in data analysis

**VARIABLES AND HYPOTHESES**

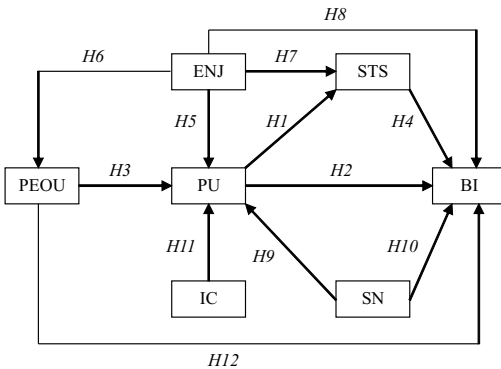
The variables defined in Table 1 are all applicable in the context of any particular LMS, which is Google Classroom in this study. Accordingly, a set of hypotheses were proposed under the relationships between the model constructs and the literature review and experts' opinions. In the literature, PU, PEOU and BI are the major determinants of the acceptance of education technology based on TAM. Hence, the following three alternate hypotheses were proposed:

- H1: PU directly and positively affects STS.
- H2: PU directly and positively affects BI.
- H3: PEOU directly and positively affects PU.

Again, ENJ, SN, STS, and IC constructs are considered according to the LMS-TAM. As a result, a total of 12 alternate hypotheses were formulated including the following ones:

- H4: STS directly and positively affects BI.
- H5: ENJ directly and positively affects PU.
- H6: ENJ directly and positively affects PEOU.
- H7: ENJ directly and positively affects STS.
- H8: ENJ directly and positively affects BI.
- H9: SN directly and positively affects PU.
- H10: SN directly and positively affects BI.
- H11: IC directly and positively affects PU.
- H12: PEOU directly and positively affects BI.

Figure 1 shows the flow of dependencies among the variables according to the proposed hypotheses.



**Figure 1. The LMS-TAM Structure with Variables and Hypotheses**

## DATA

Non-probability purposeful sampling was used for selecting 185 students studying in various university level programmes. The justifications for choosing participants selected by purposeful sampling described by McMillan and Schumacher (1993) as "they are likely to be knowledgeable and informative about the phenomena the researcher is investigating". In this case, the participants had to be familiar with Google Classroom as an LMS in their academic activities.

The survey instrument was developed with two parts: the first for the respondents' demographic information and the second with 44 items based on the definitions of the model constructs. Demographic data items include gender, age, department, education level, experience and competency regarding computer use, familiarity with various LMS, and preferred learning style. Each of the items in the second part was on a 5-point Likert scale from 1-'strongly disagree' to 5-'strongly agree'. The content validity of the instrument was assessed by a panel of three expert and experienced educators. According to the factor analysis results with reliability, Cronbach's alpha scores are found reliable as the scores above 0.7 are considered for consistency measurement (Wiersma, 1995). The survey was conducted between September 2021 and April 2022.

The study protocol was approved by the local Ethics Committee and all respondents were provided informed consent request before entering the data collection form. The data were collected anonymously by using Google forms, and participants' confidentiality was assured at every stage of the research.

## RESULTS

Demographic information of the 185 respondents is shown in Figure 2.

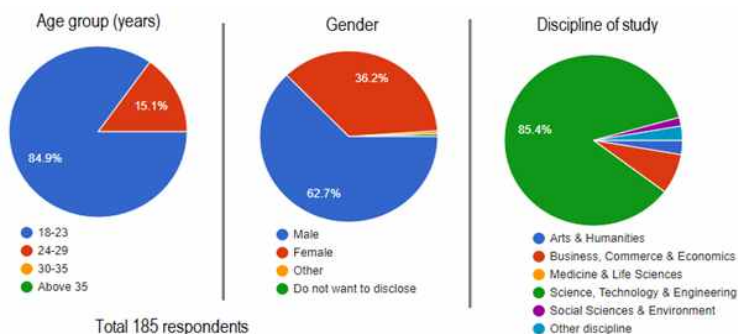


Figure 2: Age group, Gender and Study discipline of the respondents

## FACTOR AND RELIABILITY ANALYSIS

The factor structure of the dataset was examined using an exploratory factor analysis (Stevens, 2012), which was conducted together with the principal axis factors extraction method since the assumption of multivariate normality is violated (Fabrigar et al., 1999). As in the model constructs, seven different factors were obtained with the exploratory factor analysis explaining 72.43% of total variance. Table 2 depicts the factor structure with respective factor loadings and Cronbach's alpha scores. Each of the seven constructs were found to be reliable having alpha values greater than the required score of 0.7 (Wiersma, 1995). In addition, the overall questionnaire was significantly reliable with an alpha value of 0.89.

**Table 2**

### Factor and Reliability Analyses Results.

Factor	Item ID	Factor Loading							Cronbach $\alpha$
		1	2	3	4	5	6	7	
PU	PU1	0.853							0.884
	PU5	0.889							
	PU2	0.829							
	PU3	0.765							
	PU4	0.794							
PEOU	PEOU7		0.819						0.931
	PEOU4		0.857						
	PEOU1		0.831						
	PEOU6		0.635						
	PEOU10		0.758						
	PEOU5		0.836						
	PEOU2		0.799						
	PEOU9		0.831						
	PEOU3		0.809						
	PEOU8		0.718						
BI	BI5			0.889					0.961
	BI7			0.885					
	BI8			0.754					
	BI6			0.895					
	BI1			0.893					
	BI4			0.857					
	BI2			0.915					
	BI3			0.933					
	BI9			0.831					
ENJ	ENJ1				0.897				0.876
	ENJ4				0.916				
	ENJ5				0.904				
	ENJ2				0.698				
	ENJ3				0.850				
	ENJ6				0.507				
SN	SN5				0.907				0.929
	SN1				0.917				
	SN4				0.892				
	SN3				0.905				
	SN6				0.711				
	SN2				0.840				
STS	STS1					0.936			0.942
	STS4					0.906			
	STS2					0.925			
	STS3					0.928			
IC	IC3						0.889	0.904	
	IC1						0.882		
	IC2						0.847		
	IC4						0.906		

*Note. Applied rotation method is promax and Cronbach's alpha is point estimated*



### Model Assessment

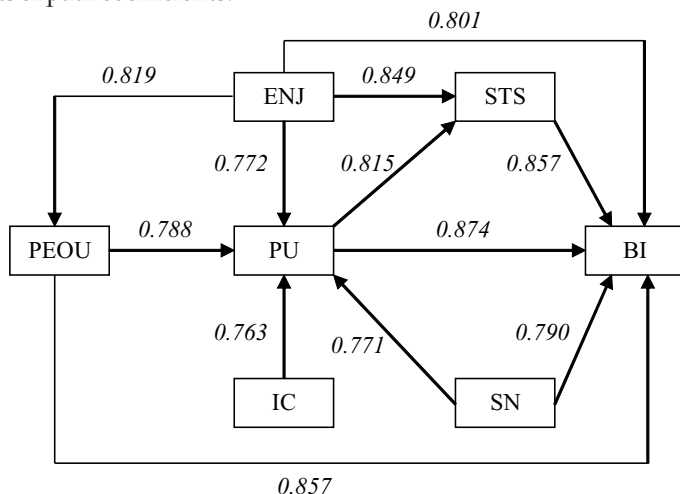
The correlation among the model constructs are found as shown in Table 3. According to the correlation coefficients found, all of the seven variables are strongly and positively influenced by each other as each of the coefficient values is more than 0.70 (Wiersma, 1995).

**Table 3**  
**Pearson's Correlation Among the Variables.**

Variable	PU	PEOU	BI	ENJ	SN	STS	IC
1. PU	—						
2. PEOU	0.788	—					
3. BI	0.874	0.857	—				
4. ENJ	0.772	0.819	0.801	—			
5. SN	0.771	0.811	0.790	0.866	—		
6. STS	0.815	0.813	0.857	0.849	0.855	—	
7. IC	0.763	0.758	0.747	0.776	0.788	0.832	—

*Note: Each Pearson's r value is with p - value < 0.001*

The structure of the LMS-TAM research model was examined by considering the path coefficient values to assess the statistical significance of each hypothesis. The dataset with 185 responses was analysed by the bootstrap procedure and the significance of difference between the constructs was evaluated according to the proposed set of hypotheses. Figure 3 shows the results of path coefficients.



**Figure 3. The LMS-TAM Structure with Results According to Hypotheses**

## Tests of Hypotheses

Results of the test of hypotheses are shown in Table 4 at the  $p < 0.001$  level of significance. The tests of hypotheses support the decision of accepting an alternative hypothesis when the  $t$ -value is greater than 12.706 with the two-tailed calculation and 1 degree of freedom ( $df = 1$ ) in the 95% level of confidence (Wiersma, 1995). Thus, the listed alternate hypotheses are found as accepted.

**Table 4**

### Summary of Hypotheses Testing.

Alternate H.	Relationship	$t$	$\beta$	Decision
H1	PU $\rightarrow$ STS	19.011	0.815	Accepted
H2	PU $\rightarrow$ BI	24.291	0.874	Accepted
H3	PEOU $\rightarrow$ PU	17.324	0.788	Accepted
H4	STS $\rightarrow$ BI	22.495	0.857	Accepted
H5	ENJ $\rightarrow$ PU	16.430	0.772	Accepted
H6	ENJ $\rightarrow$ PEOU	19.280	0.819	Accepted
H7	ENJ $\rightarrow$ STS	21.752	0.849	Accepted
H8	ENJ $\rightarrow$ BI	18.080	0.801	Accepted
H9	SN $\rightarrow$ PU	16.380	0.771	Accepted
H10	SN $\rightarrow$ BI	17.428	0.790	Accepted
H11	IC $\rightarrow$ PU	15.947	0.763	Accepted
H12	PEOU $\rightarrow$ BI	22.467	0.857	Accepted

*Note: Every score is two - tailed at 95% confidence level with  $df = 1$*

## DISCUSSION

Through this research, students' adoption of Google Classroom as LMS was examined with the factors that affect their behavioural intention towards LMS use in higher education. The constructs of LMS-TAM were taken into the appropriate statistical tools. The following discussions are made based on the results of the study.

### Perceived Usefulness and Ease-of-Use

The results ensured that perceived usefulness and perceived ease-of-use are significant predictors of behavioural intention towards LMS use. Students' perceived usefulness and ease-of-use were found to be positively and significantly affecting students' behavioural intentions. This relationship confirms that when the students perceive the system to be useful and easy to use, their behavioural intention to use the system increases. Similar findings came from the previous studies conducted by Saade and Bahli (2005), and Yi and Hwang (2003). Moreover, perceived usefulness is positively and

significantly influenced by students' perceived ease-of-use. This relationship implies that when the users of the system perceive that the system is easy to use, their perception of usefulness increases. In support, e-learning systems should be designed and developed to add value to student learning and the value of these systems can be improved by providing easy-to-use e-learning services (Lee et al., 2009). On the other hand, students' perceived usefulness positively and strongly influences students' satisfaction. This is transitively supported by Lee (2008) as suggested that a system needs to be developed with perceived ease-of-use to increase students' adoption of online learning systems.

### **Enjoyment**

The results confirmed that enjoyment is a positive and strong predictor of student's perceived usefulness and ease-of-use regarding LMS use. Similar results were reported by Yi and Hwang (2003) indicating that students' perceived enjoyment has an important effect on their perception of the usefulness and easiness of LMS. It was found that enjoyment positively and strongly impacted students' satisfaction. This finding is supported with the results of the previous study by Sorebo, Halvari, Gulli, and Kristiansen (2009) who examined enjoyment as an intrinsic motivation and found significance between intrinsic motivation and satisfaction in using e-learning technology. Moreover, enjoyment was found to have a significant effect on behavioural intention, which supports the findings of Lee et al. (2005). The researcher found that the enjoyment is a key element for the adoption and use of technology-enhanced learning.

### **Subjective Norms**

The results showed that the subjective norm strongly influenced perceived usefulness of the Google Classroom as an LMS and the students' behavioural intention. Similarly, Park (2009) found a significant relationship between subjective norm and perceived usefulness; also, between subjective norm and the behavioural intention towards the LMS use.

### **Satisfaction**

Students' satisfaction positively and strongly influenced their behavioural intention about using the LMS in higher education. Roca, Chiu, and Martínez (2006) similarly found that the satisfaction positively affects continuance intention to use e-learning applications.

### **Interactivity and Control**

The results ensured that the interactivity and control had a strong and direct effect on the participants' perceived usefulness. This is supported by Findik-Coskuncay (2018) as they found that students' perception of the usefulness of LMS increased after they used this system to have more control over their learning process.

### **Overall Summary**

As in the LMS-TAM, behavioural intention was not hypothesised to have influence on other constructs, hence, BI was not included in the test of hypothesis. Other six constructs as discussed above were supported by the results. By using the hypothetical syllogism, it can be summarised as: (i) PEOU PU STS BI, (ii) ENJ PU STS BI, (iii) SN PU STS BI, and (iv) IC PU STS BI. Therefore, for reaching to satisfaction and/or behavioural intention regarding students' adoption of Google Classroom as an LMS the ultimate original influences were perceived usefulness, ease-of-use, enjoyment, subjective norm, and interactivity and control.

### **LIMITATIONS AND IMPLICATIONS FOR FUTURE RESEARCH**

The first limitation of this study is the overly concentrated selection of respondents as they were mostly from a singly university, which did not include the social diversities regarding use of technology and attitudes of the students over technology use in education. Secondly, the number of respondents could be more for ensuring higher validity of the results found regarding adoption level with LMS use in higher education for learning.

The author of this study has formulated the following recommendations for the concerned practitioners in the field of higher education:

- The institutional authorities should provide suitable and easy-to-use platform which is technological advancement in higher education. They need to consider 'easy-to-use' over the 'free-of-cost' feature for choosing the LMS platform.
- Teachers should create a learning environment by incorporating variations of contents and teaching methods so that students' enjoyment of learning is ensured. Different features available in an LMS can be deliberately utilized for incorporating variety of teaching methods that ultimately ensure better learning of the students.

- The institutional authorities should employ instructional designers who will be responsible to customise the learning environment in the LMS according to the need of the subject of study. Subject teachers are not necessarily tech savvy. In the context, the instructional designers may help the subject teachers make an effective plan of teaching-learning and performance assessment.
- The LMS should support interactivity and control by supporting communication between the teachers and students by offering interactive tools such as chat, forum and group. Effective communications among students and teachers through a reachable and permanent network is essential for asynchronous learning.

This research is believed to be a strong base for proceeding with further research on the subject. However, the next research initiatives could be improved once the mentioned limitations are taken into consideration. In addition, the LMS-TAM model could be further improved with two approaches: one from the teacher's and the other from the student's point of view regarding the use of LMS in higher education.

## CONCLUSIONS

This study employed the LMS-TAM as a structured model for investigating the students' adoption level in using Google Classroom as an LMS in higher education. In addition to perceived ease of use and perceived usefulness over behavioural intention validated in original TAM, LMS-TAM implies that users' behavioural intention is influenced by enjoyment, subjective norm, satisfaction and interactivity and control factors. LMS-TAM has the potential to be a predictive model for measuring students' acceptance of technological tools in their formal study. The results found from this study can be supportive towards the improvement of the LMS and increase its usage. Therefore, this study contributes to the related literature for further research and to the stakeholders for improving teaching and learning practices in online setting.

## REFERENCES

- Ajzen, I. (1991). The Theory of planned behavior. *Organizational Behavior and Human Processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Allen, I., & Seaman, J. (2009). Learning on demand: Online education in the United States. *Babson Survey Research Group*. ERIC. <http://files.eric.ed.gov/fulltext/ED529931.pdf>

- Asian Development Bank. (2017). *Innovative strategies for accelerated human resource development in South Asia: Information and communication technology for education-Special focus on Bangladesh, Nepal, and Sri Lanka*. <http://dx.doi.org/10.22617/TCS179080>
- Bandura, A. (1986). *Social foundations of thought and action: A Social cognitive theory*. Prentice Hall.
- Bhuasiri, W., Xaymoungkhoun, O., Zo, H., Rho, J. J., & Ciganek, A. P. (2012), Critical success factors for e-learning in developing countries: A comparative analysis between ICT experts and faculty. *Computers & Education*, 58(2), 843-855. <https://doi.org/10.1016/j.compedu.2011.10.010>
- Borboa, D., Joseph, M., Spake, D., & Yazdanparast A. (2014). Perceptions and use of learning management system tools and other technologies in higher education: A preliminary analysis. *Journal of Learning in Higher Education*, 10(2), 17-23. <https://files.eric.ed.gov/fulltext/EJ1143243.pdf>
- Dahiya, M., & Malik, N. (2021), A survey of teachers' and students' perspective on e-learning during Covid-19 in Delhi. *MIER Journal of Educational Studies Trends & Practices*, 11(2), 200 - 222. <https://doi.org/10.52634/mier/2021/v11/i2/1804>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340. <https://doi.org/10.2307/249008>
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A Comparison of two theoretical models. *Management Science*, 35(8), 982-1003. <http://www.jstor.org/stable/2632151>
- Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A Ten-year update. *Journal of Management Information Systems*, 19(4), 9-30. <https://doi.org/10.1080/07421222.2003.11045748>
- Findik-Coskuncay, D., Alkis, N., & Ozkan-Yildirim, S. (2018). A Structural Model for Students' Adoption of Learning Management Systems: An Empirical Investigation in the Higher Education Context. *Educational Technology & Society*, 21(2), 13-27. <https://www.jstor.org/stable/26388376>
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272-299. <https://doi.org/10.1037/1082-989X.4.3.272>
- Goh, C.F., Hii, P.K., Tan, O.K., & Rasli, A. (2020). Why do university teachers use e-learning systems? *International Review of Research in Open and Distributed Learning*, 21(2), 136-155. <https://eric.ed.gov/>

[?id=EJ1250684](#)

- Google for Education. (2021). *Google Classroom: Where teaching and learning come together*. Google LLC, CA. [https://services.google.com/fh/files/misc/google\\_classroom\\_onepager.pdf](https://services.google.com/fh/files/misc/google_classroom_onepager.pdf)
- Green, S. M., Weaver, M., Voegeli, D., Fitzsimmons, D., Knowles, J., Harrison, M., & Shephard, K. (2006). The development and evaluation of the use of a virtual learning environment (blackboard 5) to support the learning of pre-qualifying nursing students undertaking a human anatomy and physiology module. *Nurse Education Today*, 26(5), 388-395. <https://doi.org/10.1016/j.nedt.2005.11.008>
- Heggart, K. R., & Yoo, J. (2018). Getting the most from google classroom: A pedagogical framework for tertiary educators. *Australian Journal of Teacher Education*, 43(3). <http://ro.ecu.edu.au/ajte/vol43/iss3/9>
- Jasim, M. M. (2020, April 4). Private university students taking online classes. *The Business Standard*. <https://tbsnews.net/coronavirus-chronicle/covid-19-bangladesh/private-university-students-taking-online-classes-64867>
- Lee, J., & Cha, K. (2021). A study on google classroom as a tool for the development of the learning model of college English. *International Journal of Contents*, 17(2). <https://doi.org/10.5392/IJoC.2021.17.2.065>
- Lee, Y.-C. (2008). The role of perceived resources in online learning adoption. *Computers & Education*, 50(4), 1423-1438. <https://doi.org/10.1016/j.compedu.2007.01.001>
- Lee, B.-C., Yoon, J.-O., & Lee, I. (2009). Learners' acceptance of e-learning in South Korea: Theories and results. *Computers & Education*, 53(4), 1320-1329. <https://doi.org/10.1016/j.compedu.2009.06.014>
- McMillan, J. H., & Schumacher, S. (1993). *Research in education: A conceptual understanding*. Harper Collins.
- Park, S. Y. (2009). An analysis of the technology acceptance model in understanding university students' behavioral intention to use e-learning. *Educational Technology & Society*, 12(3), 150-162. <https://www.jstor.org/stable/jeductechsoci.12.3.150>
- Ra, S., Chin, B., & Lim, C. P. (2016). A holistic approach towards information and communication technology for addressing education challenges in Asia and the Pacific. *Educational Media International*, 53 (2), 69-84. <https://doi.org/10.1080/09523987.2016.1211334>
- Roca, J. C., Chiu, C.-M., & Martínez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human-Computer Studies*, 64(8), 683-696. <https://doi.org/10.1016/j.ijhcs.2006.01.003>
- Saade, R., & Bahli, B. (2005). The Impact of cognitive absorption on perceived usefulness and perceived ease of use in online learning: An Extension of the technology acceptance model. *Information & Management*, 42(2), 317-327. <https://doi.org/10.1016/j.im.2003.12.013>

- Sakib, A. N. (2020, 16<sup>th</sup> March). COVID-19: Bangladesh Shuts All Educational Institutions. *Anadolu Agency*. <https://www.aa.com.tr/en/asia-pacific/covid-19-bangladesh-shuts-all-educational-institutions/1767425>
- Schacter, J. (1999). *The Impact of Education Technology on Student Achievement: What the Most Current Research Has to Say*. Santa Monica, California: The Milken Family Foundation.
- Sorebo, O., Halvari, H., Gulli, V. F., & Kristiansen, R. (2009). The Role of self-determination theory in explaining teachers' motivation to continue to use e-learning technology. *Computers & Education*, 53(4), 1177-1187. <https://doi.org/10.1016/j.compedu.2009.06.001>
- Stevens, J. P. (2012). *Applied multivariate statistics for the social sciences*. Routledge.
- Traxler, J. (2018). Distance Learning-Predictions and Possibilities. *Education Science*, 8(35). <https://doi.org/10.3390/educsci8010035>
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 11(4), 342-365. <https://www.jstor.org/stable/23011042>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Wiersma, W. (1995). *Research methods in education: An introduction* (6th ed.). Simon & Schuster Company.
- World Health Organization. (2020, March 11). WHO Director-General's Opening Remarks at the Media Briefing on Covid-19. *WHO*.
- Yi, M. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: Self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies*, 59(4), 431-449. [https://doi.org/10.1016/S1071-5819\(03\)00114-9](https://doi.org/10.1016/S1071-5819(03)00114-9)