Exploring the Factors Affecting Behavioural Intention to Use Google Classroom: University Teachers' Perspectives in Bangladesh and Nigeria

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Abstract

University teachers in Bangladesh and Nigeria, in general, are novices in using modern technologies such as Google classroom in the teaching learning process. This study aims to explore teachers' attitudes towards the use of Google classroom and investigate the factors that influence the teachers' acceptance and behavioural intentions to use it as a learning management system. A quantitative method has been used to examine the teachers' acceptance of Google classroom based on a simplified technology acceptance model (TAM) in two universities located in Bangladesh and Nigeria. The study reveals that Bangladeshi teachers have a higher positive attitude towards accepting this platform compared to Nigerian teachers. Besides, Nigerian teachers are impacted significantly by the technology challenges during its use. The findings of this study inform educators of the key aspects of Google classroom use which could enable them to effectively adopt it during and post the COVID-19 pandemic.

Keywords Google classroom · Technology acceptance model (TAM) · Teachers' attitude · Higher education · Bangladesh · Nigeria

Introduction

The COVID-19 pandemic forced educational institutions to be dependent on technology more than ever before. Schools and universities around the world are radically transforming education by switching to the online mode and launching e-learning portals (Kulikowski et al., 2021, Al Mamun et al., 2022). In accord with this trend, Bangladesh and Nigeria too are trying to integrate learning management systems (LMS) into higher educational institutions. Specifically, Google classroom is gaining popularity among the teachers of these two countries because of its usability, cost effective nature, and simple interface to create a digital hub for collaborative learning (Chowdhury, 2020; Olufunke, 2020). Research also shows that Google classroom can improve the attainment of graduate attributes in higher education (Madhavi et al., 2018).

However, the integration of new technology into the teaching-learning process does come with drawbacks. Reframing the educational setting with the integration of suitable pedagogy frequently remains a formidable challenge in the online environment (Al Mamun, Lawrie & Wright, 2020; Al Mamun, Lawrie & Wright, 2022). In addition, teachers' unwillingness and readiness to accept new technology is a well-known issue among educational researchers (Bauwens et al., 2020; Cheng et al., 2020; Shah et al., 2021). New technologies can impact teachers' attitudes, motivations, and technical competence in their teaching practices (König et al., 2020). Indeed, accepting new technology and changing their teaching styles accordingly pose great challenges for teachers. For example, the popular online pedagogical approach of flipped teaching in the blended learning environment has often failed due to the lack of teachers' effective use of technology in their teaching practice (Al Mamun et al., 2021). Research indicates that teachers' values and expectancy beliefs affect their technology use (Cheng et al., 2020). Researchers also argue that a lack of technological and pedagogical training leads to unsuccessful teaching practices (Gámez et al., 2020). This is even more true for teachers in developing countries such as Bangladesh and Nigeria,

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who are confronted with similar challenges while adopting Google classroom into the ‘fabric’ of their teaching practices.

Commonly, teachers in Bangladesh and Nigeria lack available technology resources for educational use for several reasons including low technology dependence, weak technological infrastructure, low socio-economic status (Eze et al., 2018; Rahman et al., 2019). These challenges imply that most teachers have low technical skills to manage these technologies in their everyday life. This issue raises a genuine concern about the teachers’ potential ability and competence for making effective use of Google classroom while implementing their teaching activities (Islam et al., 2017; Olufunke, 2020; Patience et al., 2020). Therefore, a relevant area to explore is how the teachers of Bangladesh and Nigeria are adopting modern technology to meet the ever-changing educational dynamics. This study aims to fill this gap by examining the factors that impact teachers’ attitudes to adopting Google classroom into their teaching-learning processes. Thus, an attempt has been made to develop and validate a modified technology acceptance model for the teachers of Bangladesh and Nigeria to investigate their acceptance and future intention to use Google classroom. Furthermore, a comparison between the two cohorts of university teachers located in Bangladesh and Nigeria was drawn to investigate how they perceived Google classroom and to ascertain whether they intended to use the platform in their teaching process. In this regard, the following research questions were formulated for investigation:

1. What is the reliability and validity evidence for the modified Technology Acceptance Model in the contexts of Bangladesh and Nigeria?
2. To what extent do the teachers of Bangladesh and Nigeria accept Google classroom for their teaching practice?

Google Classroom: The Contexts of Bangladesh and Nigeria

Listed amongst low and middle-income countries (LMIC), both Bangladesh and Nigeria hold a similar economic status in terms of the Human Development Index (HDI) and gross domestic product (GDP) per capita (UNDP report, 2019). Therefore, it seemed likely that the teachers in these two countries are in a similar socioeconomic position in relation to technology use.

At the institutional level, several higher institutions in Bangladesh are trying to use the Google classroom as their default learning management system and has been adopted increasingly in recent years (Chowdhury, 2020; Zafrin, 2018). Recent research also shows increased adoption of Google classroom in different study areas, courses, and programs (Afrin, 2020; M. S. Islam & Ferdousi, 2019; Rabbi et al., 2017). Also, researchers are exploring the students’

perceptions and use satisfaction of Google classroom in various programs (Chowdhury, 2020; A. Islam et al., 2017; Islam, 2019). Previous studies reveal the effective dynamics of e-learning activities such as watching lecture videos, viewing course information, reading fellow students’ posts in the LMS forum (Sarker et al., 2019).

Researchers have also attempted to identify the factors affecting users’ acceptance and intention to use educational technology by applying the Technology Acceptance Model (TAM). For example, the investigation undertaken by Amin et al. (2016) identified the determinants of students’ acceptance of e-learning platforms (e.g., Google classroom and other LMSs) in Bangladesh. The findings of this study revealed the direct impact of self-efficacy (SE) on perceived ease of use, but the focus group discussion and interview data confirmed that students were still not satisfied with the user interface of the LMSs. In a similar vein, some studies reported that many users faced challenges while using Google Classroom in teaching-learning situation (M. S. Islam, 2019; Sarker et al., 2019).

In brief, the majority of the studies conducted in Bangladesh, though limited in number, have either focused on exploring the impact of Google classroom on a particular subject area or concentrated on students’ perceptions of it during the learning process. Only one research study conducted by Rony and Awal (2019) has focused on teachers’ perceptions of using online teaching from a broader perspective. Rony and Awal (2019) explored the changes in perceptions of the faculty members regarding challenges in online teaching. Their study revealed an effective change of mindset and perceptions in the faculty members because of the training received in online teaching.

Correspondingly, Nigeria also slowly adopted and integrated Google classroom in its education sectors. Several research studies reported the potential benefit of Google classroom in several Nigerian institutions. For example, Mafa (2018) found that Google classroom was impacting online teaching and learning performances among the higher educational institutions of Nigeria. In creating effective learning environments, teachers were using Google classroom in different courses and programs (Al-Gahtani, 2016; Mohd et al., 2016). Other studies also found that Google classroom was effective in delivering instruction through blended learning (Abdullahi et al., 2017) promoting students becoming more active learners and improving their attentiveness during learning (Libata et al., 2020). Despite all the potential benefits Google classroom might provide within the context of Nigerian education system, Udosen and Adie (2019) revealed that many teachers were not using Google classroom effectively in teaching and learning. In short, all these studies indicate that a greater emphasis is required to investigate how to improve Nigerian teachers’ skills and attitudes for using this platform.

The Research Model and Hypothesis

This study is framed by the Technology Acceptance Model (TAM) proposed by Davis (1985). TAM is a simple but versatile model to examine and explain how and why users accept or reject a new technology. TAM is also used to examine people's intention to use technological systems (King & He, 2006). Thus, this study adopted TAM as a vehicle to propose a modified conceptual model to measure teachers' attitudes and behavioural intentions to use the Google classroom in the context of Bangladesh and Nigeria.

Although several models based on TAM exist in the literature, the current study proposes some important constructs specific to the contexts of Bangladesh and Nigeria. Context specific factors refer to the external factors in the original TAM model. In the context of Bangladesh and Nigeria, the first external factor emerging is teacher awareness of the Google classroom. Research shows that many teachers are not well-informed about the affordances of the Google classroom and the benefits it can offer to their teaching and learning processes (Azhar & Iqbal, 2018). Although the term awareness may have several meanings, in this context, it refers to the teachers' knowledge about the Google classroom and the positive impact it can provide to their teaching. Liechti and Sumi (2002) reported that the value of awareness in the online environment can shape the future contexts of learning. Research also shows that awareness facilitates the adoption of new technology (Chen, 2013).

The second context specific construct, commonly found in developing countries, is the technology challenges teachers face when using the Google classroom (Moubayed et al., 2018). In this study, technology challenges refer to the challenges facing individual teachers in using Google classroom in the process of designing and delivering the online courses. It is evident that being technical novices, most of the teachers in developing countries faced difficulties incorporating technology into their teaching methods (García-Segura & Peña, 2017). In fact, during the pre-COVID era, many teachers in developing countries did not consider technology as an essential component of their teaching (Hernandez, 2019; Udosen & Adie, 2019).

These two-context specific issues—*awareness* and *technology challenges*—lead to a third important issue which is the operational ability of the teachers. Operational ability refers in this study to teachers' technical skills and ability to use Google classroom and their ability to perform all the necessary actions required for teaching. Research shows that when teachers lack the ability and skills in using technology, they resist its use (Chigona & Chigona, 2010). When teachers do not have the requisite skills, this knowledge deficit becomes the key barrier to technology integration into their teaching practice (Ertmer

et al., 2012). Therefore, it is imperative to investigate this important construct in the current study context and explore how the two external constructs *awareness* and *technology challenges* affect the ability of teachers to use Google classroom.

The literature shows that teachers' skills and ability to use technology can influence their perceived ease of use (Covey et al., 2021; Davis, 1989; Ifinedo & Kankaanranta, 2021). *Perceived ease of use* is a key component in the TAM model to explain people's acceptance process when new technology emerges (Davis, 1989). *Perceived ease of use* is defined as “the degree to which a person believes that using a particular system would be free of physical and mental effort” (Davis, 1989, p.320). In regard to the TAM, perceived ease of use affects perceived usefulness and at the same time influences acceptance intention. This model also suggests that external variables can affect perceived ease of use and can be identified as external incentives associated with the system design, which could be different for each system (Davis, 1993). Studies of teachers' acceptance of technology also revealed that teachers' beliefs and attitudes influence their intention and actual use of LMSs (Fathema et al., 2015). Ballew (2017) endeavoured to investigate teachers' preconceived notions, carried from their earlier experiences and how it affects the implementation of Google classroom effectively in the teaching-learning process.

Based on the discussion above and considering all the external factors that can affect teachers' acceptance of using Google classroom, this study proposed a modified TAM model (see Fig. 1) to measure teachers' behavioural intention to use Google classroom in the contexts of the two universities of Bangladesh and Nigeria.

In the process of validation of this proposed model, the following hypotheses were tested:

- H₁: Awareness positively affects operational ability
- H₂: Technology challenges negatively affect operational ability
- H₃: Awareness positively affects perceived ease of use

Fig. 1 The proposed model to measure teachers' behavioural intention to use Google Classroom

- H₄: Technology challenges negatively affect perceived ease of use
- H₅: Operational ability positively affects perceived ease of use
- H₆: Perceived ease of use positively affects behavioural intention to use
- H₁₅: Operational ability mediates the relationship between awareness and perceived ease of use
- H₂₅: Operational ability mediates the relationship between technology challenges and perceived ease of use
- H₃₆: Perceived ease of use mediates the relationship between awareness and behavioural intention to use
- H₄₆: Perceived ease of use mediates the relationship between technology challenges and behavioural intention to use
- H₅₆: Perceived ease of use mediates the relationship between operational ability and behavioural intention to use

Methodology

Contexts and Participants

As reported earlier, Bangladesh and Nigeria hold similar status in terms of the human development index (HDI) and gross domestic product (GDP) per capita. These two countries have further cross-cultural similarities in terms of religion and economic status. For example, Bangladesh and Nigeria enjoy a bilateral relationship as they are both members of specific international organisations including the Organisation of Islamic Cooperation and Developing 8 Countries (Developing8.org, [n.d.](#); OIC, [n.d.](#)). They have agreements in trade and investment, agriculture and tourism that further solidify the relations between them (Bangladesh–Nigeria relations, [n.d.](#); Developing8.org, [n.d.](#)). These connections and their similar status gave the authors reasons to believe that the teachers of these two countries are in a similar position to access the technology in their teaching practices.

The first author of this article has teaching experience in a Nigerian university while the second author's primary experience has been obtained in a Bangladeshi university. The author from a Nigerian university has also studied in Bangladesh. Both the authors observed that the two countries under study share common features in their university education systems. Also, both universities have common challenges in the aspect of technology integration into their systems. Furthermore, due to their first-hand experience in the two universities under study, both authors have cross-validated the study context in terms of appreciating teachers' existing knowledge and skills in using the technology tools, specifically the Google classroom.

At the time of data collection, there was no mandatory policy to use Google classroom by the teachers in these two universities. In fact, there was no official learning management system available in these two universities during the study period. Teachers were using Google classroom personally as a free service that comes with their Google account. In addition, no training, workshops nor any professional development programs related to Google classroom have been conducted in these two universities up to the time of data collection. Primarily, teachers are trying to use and integrate the Google classroom into their teaching practice as individuals.

The survey instrument developed for the study was distributed using a Google form through email invitation. Based on the characteristics of the population and the objectives of the study, purposive sampling was employed to collect the data. Only the teachers who were using Google classroom in their teaching practices were invited to complete the survey. Also, teachers from all disciplines were considered for participation in this study. This study collected data from 27 teachers in each university, i.e., altogether 54 participants were involved.

Survey Instrument Development

To measure the teachers' acceptance of Google classroom use, a modified survey instrument based on the technology acceptance model by Davis (1989) was adopted. This survey is made up of five constructs: *Awareness (AW)*, *Technology Challenges (TC)*, *Operational Ability (OA)*, *Perceived Ease of Use (PEU)* and *Behavioural Intention to Use (BIU)*. A 7-point Likert scale was used to measure teachers' attitudes towards Google classroom on a continuum scale from *strongly disagree (1)* to *strongly agree (7)*.

Initially, a 25 items survey instrument was developed in which each construct was composed of 5 items, respectively. After the initial trial of this survey instrument with a small number of teachers as well as receiving feedback from some experts in assessment tools employed for research, one item from the *Awareness* construct was eliminated. Therefore, the final survey was comprised of 24 items in total. The *Awareness (AW)* construct includes four items which are adapted from Mutahar et al. (2018). *Technology Challenges (TC)* consists of five items (Viitanen et al., 2011); *Operational Ability (OA)* five items (Bailey, 2002; Davis, 1989), *Perceived Ease of Use (PEU)* five items (Al-Marooof & Al-Emran, 2018; Gefen & Straub, 2003) and *Behavioural Intention to Use (BIU)* also five items (Al-Marooof & Al-Emran, 2018; Venkatesh et al., 2008). It is noted that one negatively worded item (i.e., OA5) has been included in the survey scale (see [Appendix](#)) which has been reverse coded during the data analysis.

Data Analysis Technique

First, to validate the proposed modified TAM framework and the relationships among the constructs, Partial Least Squares-Structural Equation Modelling (PLS-SEM) using SmartPLS 3 was employed (Ringle et al., 2015). The PLS method is more reliable and efficient for processing non-normally distributed data (Hair et al., 2011). Also, it can handle a small sample size better than other multivariate techniques (Marcoulides & Saunders, 2006). Following the recommended two-stage analytical procedures by Anderson and Gerbing (1988), a measurement model (validity and reliability of the measures) and the structural model (testing the hypothesized relationship) were examined for the proposed model.

Hair et al. (2017) made several recommendations to test the measurement and structural model. In the measurement model, also known as an outer model, they suggested considering the outer loadings of the survey items and the average variance extracted (AVE) to determine the convergent validity. For a discriminant validity, cross loading and Fornell–Larcker criterion were examined. Moreover, Henseler et al. (2015) suggested examining the Heterotrait–Monotrait for assessing stricter discriminant validity.

In the structural model, we examined the path coefficients, and the coefficient of determination (R^2) (Hair et al., 2017). Further, Hair et al. (2017) suggested using the bootstrapping method to test the significance of the path coefficients based on t-values. The hypotheses were tested for the main and indirect effects through the bootstrapping procedure at the significance level, $p < 0.05$.

Second, some descriptive statistics were conducted to obtain insights into the mean, standard deviation, minimum, maximum, kurtosis, and skewness of the data of the five constructs revealed by the Bangladeshi and Nigerian teachers. This analysis shows how the teachers' opinions in the contexts of Bangladesh and Nigeria varied within the five constructs. Third, to compare the teachers' attitudes in accepting the Google classroom between Bangladesh and Nigeria, we used the MANOVA tool. This analysis primarily shows whether any significant differences exist between the teacher's opinions in Bangladesh and Nigeria.

Results

Assessing Measurement Model

Reliability and Convergent Validity

The measurement model was assessed for reliability and convergent validity by using PLS factor loadings of the items, average variance extracted (AVE), composite

reliability (CR), and Cronbach's alpha of the constructs. In this process, only those items that exceeded the recommended value of Cronbach's alpha (0.70) and composite reliability (0.70) to confirm the reliability of the measurement model were retained. Also, items with a low factor loading (less than 0.60) were excluded from the model. In this process, 1 item from both OA and PEU and 2 items from both TC and BIU were removed to make it an 18 items measurement model. Table 1 shows, all values of the 18 items met the recommended threshold values of average variance extract (0.50) (Hair et al., 2017). Thus, all the constructs in the model exhibited adequate reliability and construct validity (Hair et al., 2010).

Discriminant Validity

In this study, the discriminant validity of the model has been established by examining the Fornell–Larcker criterion, cross loadings, and the heterotrait–monotrait ratio of correlations (HTMT). For the constructs to exhibit adequate discriminant validity, the correlation among the latent constructs must be less than the square root of the AVEs of the latent constructs (Fornell & Larcker, 1981). Table 2 shows that the correlation values of the latent constructs (non-diagonal) are less than the square root of the AVEs (diagonal values in bold). Thus, the proposed model shows satisfactory discriminant validity.

Regarding the cross loadings, as shown in Table 3, the loading of each indicator (values in bold) is higher than the loadings of its underlying construct, which fulfils the criteria described by Hair et al. (2017) and ultimately establishes the discriminant validity of the measurement model of this study.

Further, we examined the HTMT ratio (Henseler et al., 2015) of the correlations to assess discriminant validity. The HTMT approach estimates the actual correlation between the constructs when they are perfectly reliable. This is also known as a disattenuated correlation. A perfect correlation between two constructs (correlation value close to 1.0) suggests a lack of discriminant validity.

As can be seen in Table 4, all values of the constructs in the model are below the threshold value of .85 (Henseler et al., 2015) and thus, exhibit adequate discriminant validity.

Assessing Structural Model

We examined the structural model for multicollinearity issues, predictive explanatory power (R^2), and predictive relevance (Q^2) of the relationships among the theoretical constructs.

Table 5 shows that the values of variance inflation factor (VIF) are all below 5.0 suggesting no multicollinearity issues exist in the model. Traditionally, VIF values above 5

Table 1 Reliability and Convergent validity

Theoretical Constructs	Items	Loadings	Cronbach's Alpha (α)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Awareness	AW1	0.804	0.715	0.818	0.532
	AW2	0.753			
	AW3	0.734			
	AW4	0.611			
Technology Challenges	TC1	0.863	0.874	0.921	0.796
	TC2	0.913			
	TC5	0.898			
Operational Ability	OA1	0.944	0.950	0.964	0.869
	OA2	0.942			
	OA3	0.938			
	OA4	0.906			
Perceived ease of use	PEU1	0.843	0.919	0.943	0.805
	PEU2	0.924			
	PEU3	0.936			
	PEU4	0.884			
Behavioural intention to use	BIU1	0.875	0.812	0.889	0.728
	BIU2	0.884			
	BIU5	0.797			

Table 2 Latent Variable Correlations with Fornell-Larcker Criterion

	AW	BIU	OA	PEU	TC
AW	0.729				
BIU	0.526	0.853			
OA	0.366	0.573	0.932		
PEU	0.529	0.658	0.699	0.897	
TC	−0.016	−0.247	−0.290	−0.282	0.892

are regarded as indications of problematic multicollinearity (Hair et al., 2017) and above 10 implies a severe multicollinearity issue (Kline, 2016). Multicollinearity issue indicates strong intercorrelations among the constructs and shows inadequate discriminant validity of the model.

The predictive explanatory power (R^2 value) shows to what extent the dependent variables are explained by the independent variables (see Fig. 2 and Table 5). According to Hair et al. (2017), predictive explanatory power can be classified as weak, moderate, or strong when R^2 values are 0.19, 0.33 or 0.67, respectively. Our model shows a significant explanatory power ($R^2 = 0.586$) for awareness (AW), operational ability (OA), and technology challenges (TC) to explain the perceived ease of use (PEU). Perceived ease of use (PEU) ($R^2 = 0.434$) shows moderate explanatory power to explain behavioural intention to use (BIU). Furthermore, awareness (AW) and technology challenges (TC) ($R^2 = 0.215$) show satisfactory explanatory power to explain the operational ability (OA). This indicates that the structural model satisfies all the model fit indices.

We also examined cross validated redundancy (Q^2) to measure the predictive relevance of the model regarding the dependent latent variables. Chin (2010) reports that the resulting Q^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large predictive relevance, respectively. As the results in Table 5 indicate, the structural model is acceptable as the exogenous constructs have medium to large predictive relevance for the endogenous constructs in the model.

Testing Hypothesis

Following the recommendations made by Hair et al. (2017), we assessed the statistical significance of the path coefficients of the structural model by measuring the standardized regression (β), and the corresponding t-values via a bootstrapping procedure with 5000 iterations. In addition, we also reported the effect sizes (f^2) as suggested by Hair et al. (2017). Sullivan and Feinn (2012) emphasized that a p value only suggests the existence of a statistically significant effect, without informing the size of the effect. Therefore, in reporting and interpreting the results, Sullivan and Feinn (2012) suggest that both the effect size (f^2) and statistical significance (p value) are required. As per the guidelines suggested by Cohen (1988), f^2 values of 0.02, 0.1, and 0.35 indicate small, medium, and large effect sizes, respectively.

Table 6 shows the path coefficients and statistically significant results for all the hypotheses with medium to large effect sizes, except H_4 . The results reveal that hypothesis H_1 and H_2 are supported as awareness ($\beta = 0.362$, $t = 2.814$, $p < 0.05$, $f^2 = 0.167$), and technology challenges ($\beta = -0.285$, $t = 2.182$,

Table 3 Cross-Loadings results of the measurement model items

	Awareness	Behavioural Intention to Use	Operational Ability	Perceived Ease of Use	Technology Challenges
AW1	0.804	0.475	0.360	0.478	−0.053
AW2	0.754	0.413	0.282	0.462	0.024
AW3	0.735	0.290	0.197	0.232	0.008
AW4	0.611	0.285	0.156	0.262	−0.015
TC1	−0.010	−0.092	−0.198	−0.196	0.863
TC2	−0.022	−0.213	−0.288	−0.224	0.913
TC5	−0.010	−0.314	−0.277	−0.315	0.898
OA1	0.339	0.544	0.944	0.671	−0.352
OA2	0.356	0.570	0.942	0.627	−0.236
OA3	0.319	0.485	0.938	0.642	−0.281
OA4	0.353	0.536	0.906	0.665	−0.208
PEU1	0.478	0.478	0.629	0.843	−0.369
PEU2	0.495	0.577	0.620	0.924	−0.177
PEU3	0.456	0.605	0.623	0.936	−0.143
PEU4	0.468	0.689	0.634	0.884	−0.318
BIU1	0.450	0.875	0.601	0.563	−0.397
BIU2	0.390	0.884	0.488	0.561	−0.224
BIU5	0.505	0.797	0.375	0.559	−0.008

Table 4 Results of Heterotrait-Monotrait (HTMT) Ratio for discriminant validity

	AW	BIU	OA	PEU	TC
AW	–				
BIU	0.654	–			
OA	0.411	0.652	–		
PEU	0.602	0.758	0.747	–	
TC	0.064	0.297	0.311	0.304	–

Table 5 Results of the structural model

Relationships	Variance inflation factor (VIF)	Predictive explanatory power (R^2)	Cross validated redundancy (Q^2)
AW → OA	1.00	0.215	0.180
TC → OA	1.00		
AW → PEU	1.167	0.586	0.444
OA → PEU	1.274		
TC → PEU	1.104		
PEU → BIU	1.00	0.434	0.297

$p < 0.01$, $f^2 = 0.103$) have a statistically significant influence on operational ability. Similarly, awareness ($\beta = 0.327$, $t = 3.040$, $p < 0.05$, $f^2 = 0.222$), and operational ability ($\beta = 0.544$, $t = 5.311$, $p < 0.001$, $f^2 = 0.562$) significantly impacted the perceived ease of use suggesting hypothesis H_3 and H_5 are supported. Hypothesis H_4 is rejected therefore technology

challenges do not influence the perceived ease of use. Finally, hypothesis H_6 is supported as perceived ease of use ($\beta = 0.659$, $t = 6.029$, $p < 0.001$, $f^2 = 0.757$); it has a statistically significant impact on the behavioural intention to use.

Testing Hypothesis for the Mediation Effects

The results of the specific indirect effects of the model in Table 7 show that operational ability mediates the relationship between awareness and perceived ease of use. Similarly, perceived ease of use mediates the relationships of awareness and operational ability with behavioural intention to use. We also found that there is no mediation effect between technology challenges (TC) and perceived ease of use (PEU), and between technology challenges (TC) and behavioural intention to use (BIU).

Impact of Country on the Teachers' Acceptance and Use of Google Classroom

Table 8 provides descriptive statistics on teachers' opinions about the related constructs of the proposed model. The mean value of Bangladeshi teachers' opinions towards Google classroom is higher for every construct except the technology challenges. This means, Bangladeshi teachers are more capable of using Google classroom and show a positive attitude towards accepting Google classroom compared to Nigerian teachers. The findings also show that Nigerian teachers face more technology challenges compared to Bangladeshi teachers.

To test whether the differences among the Bangladeshi and Nigerian teachers are statistically significant, a

Fig. 2 Results of the structural model **Table 6** Results of the hypothesis testing (direct effects)

Hypothesis	Relationships	Std. beta (β)	Std. error	t-value	p value	Decision	f ²
H ₁	AW → OA	0.362	0.129	2.814**	0.005	Supported	0.167
H ₂	TC → OA	-0.285	0.130	2.182*	0.029	Supported	0.103
H ₃	AW → PEU	0.327	0.108	3.040**	0.002	Supported	0.222
H ₄	TC → PEU	-0.117	0.102	1.151	0.250	Rejected	0.030
H ₅	OA → PEU	0.544	0.103	5.311***	0.001	Supported	0.562
H ₆	PEU → BIU	0.659	0.109	6.029***	0.001	Supported	0.757

*Significant at $p < 0.05$; **Significant at $p < 0.01$; ***Significant at $p < 0.001$

Table 7 Test results of the mediation effects

Hypothesis	Mediating paths	Std. beta (β)	Std. error	t-value	p value	Mediation effect
H ₁₅	AW → OA → PEU	0.197	0.091	2.154	0.031*	Yes
H ₂₅	TC → OA → PEU	-0.155	0.087	1.775	0.076	No
H ₃₆	AW → PEU → BIU	0.216	0.080	2.696	0.007**	Yes
H ₄₆	TC → PEU → BIU	-0.077	0.067	1.163	0.245	No
H ₅₆	OA → PEU → BIU	0.359	0.099	3.619	0.001***	Yes

*Significant at $p < 0.05$; **Significant at $p < 0.01$; ***Significant at $p < 0.001$

MANOVA analysis was conducted. Box's tests of equality of covariance matrices show Box's $M = 28.446$, $F(15, 10,887.158) = 1.699$, $P > .01$, which suggests that variance covariance matrices are equal for both the countries and hold the multivariate assumptions for the MANOVA.

As illustrated in Table 9, the MANOVA results show that there is a significant difference between the teachers of Bangladesh and Nigeria when the variables awareness was considered together, i.e., technology challenges, operational ability, perceived ease of use, and behavioural intention to use as Wilk's lambda (λ) = 0.30, $F(5, 48) = 22.443$, $p = .000$, Partial

eta squared = .700. Therefore, an ANOVA test was conducted for each dependent variable with an alpha level of 0.025. Before, conducting the ANOVA, we tested Levene's test of equality of error variances and reported no major violation.

Under the study condition, the results in Table 10 indicate no significant differences between Bangladeshi and Nigerian teachers on awareness about the Google classroom as $F(1, 52) = 0.472$, $p = 0.495$, Partial eta squared = 0.009. However, the results do show some statistically significant differences between the teachers of the sampled Bangladeshi and Nigerian universities in their acceptance of Google classroom-

Table 8 Descriptive statistics of the participants data

Constructs	Country	N	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
AW	Bangladesh	27	22.2593	3.02035	14.00	28.00	−.549	1.291
	Nigeria	27	21.5556	4.37944	11.00	27.00	−1.091	.618
OA	Bangladesh	27	22.1481	6.26777	6.00	28.00	−1.381	.988
	Nigeria	27	16.9630	6.49545	5.00	27.00	−.199	−1.014
TC	Bangladesh	27	8.0741	4.25103	3.00	19.00	.678	.062
	Nigeria	27	17.6667	2.41788	11.00	21.00	−1.023	1.108
PEU	Bangladesh	27	23.3333	3.26991	16.00	28.00	−.207	−.484
	Nigeria	27	20.1111	5.10907	10.00	27.00	−.471	−.642
BIU	Bangladesh	27	16.4074	3.71338	6.00	21.00	−.918	1.003
	Nigeria	27	13.4444	3.75534	6.00	19.00	−.263	−.905

Table 9 MANOVA analysis showing the impact of country on teachers' acceptance and use of Google classroom

Grouping variables	Wilk's lambda (λ)	F	Hypothesis df	Error df	P	Partial eta squared
Country	.300	22.443	5.0	48.0	.001***	.700

***Significant at $p < .001$ **Table 10** F test results for country variables on teachers' acceptance and use of Google classroom

Dependent variables	Categorical variables	M	SD	df	Error	F	P	Partial eta squared
AW	Bangladesh	22.259	3.02	1	52	.472	.495	.009
	Nigeria	21.556	4.38					
TC	Bangladesh	8.074	4.25	1	52	103.878	.001***	.666
	Nigeria	17.667	2.42					
OA	Bangladesh	22.148	6.27	1	52	8.910	.004**	.146
	Nigeria	16.963	6.50					
PEU	Bangladesh	23.333	3.27	1	52	7.619	.008**	.128
	Nigeria	20.111	5.12					
BIU	Bangladesh	16.407	3.71	1	52	8.498	.005**	.140
	Nigeria	13.444	3.76					

Significant at $p < 0.01$; *Significant at $p < 0.001$

- Statistically significant differences exist in *Technology challenges* of using Google classroom as $F(1, 52) = 103.878$, $p = .000$, partial eta squared = .666, with Bangladeshi teachers ($M = 8.074$) scoring lower than Nigerian teachers ($M = 17.667$).
- Statistically significant differences exist in *Operational Ability* of using Google classroom as $F(1, 52) = 8.910$, $p = .004$, partial eta squared = .146, with Bangladeshi teachers ($M = 22.148$) scoring higher than Nigerian teachers ($M = 16.963$).
- Statistically significant differences exist in *Perceived Ease of Use* about Google classroom as $F(1, 52) = 7.619$, $p = .008$, partial eta squared = .128, with Bangladeshi teachers ($M = 23.333$) scoring higher than Nigerian teachers ($M = 20.111$).
- Statistically significant differences exist in *Behavioural Intention to Use* of Google classroom as $F(1, 52) = 8.498$, $p = .005$, partial eta squared = .140, with Bangladeshi teachers ($M = 16.407$) scoring higher than Nigerian teachers ($M = 13.444$).

Discussion

In this study, we examined the teachers' acceptance and behavioural intention to use Google classroom in the contexts of one Bangladeshi and one Nigerian university based on a model adapted from the technology acceptance model (TAM)

developed by Davis (1989). Our findings suggest that the proposed model used in this study is valid and reliable for measuring teachers' opinions about using this platform and their future intention to use it as a learning management system.

The findings show that *Awareness*, *Operational Ability*, and *Technology Challenges* together have a strong predictive power (see Fig. 1, explanatory power, $R^2 = 0.586$) to explain teachers' *Perceived Ease of Use* regarding the Google classroom. In fact, both *Awareness* and *Operational Ability* significantly impact teachers' *Perceived Ease of Use* supporting hypotheses H_3 and H_5 . Our findings confirm the results of previous studies in which awareness about the affordances of technology influenced the adoption of technology (Chen, 2013). Similarly, knowing about the usability and usefulness of Google classroom positively influenced users' *Operational Ability* (H_1). When teachers have both awareness and operational ability, these have a positive impact on perceived ease of use and therefore accelerate its adoption in the teaching learning process (Brown & Hocutt, 2015; Iftakhar, 2016).

The structural model also reveals that *Technology Challenges* negatively impact teachers' *Operational Ability* and *Perceived Ease of Use*. Though the impact of *Technology Challenges* is not significant on *Perceived Ease of Use* (H_4), it has a statistically significant impact on *Operational Ability* (H_2). In some studies, teachers' weak technology skills are revealed as the main barrier to their operational ability to successfully integrate the e-learning platform into their teaching practices (Almaiah et al., 2020). Research indicates that teachers were reluctant to accept and use the new technology if they lacked technology skills (Vershetskaya et al., 2020). In contrast, teachers could become more efficient if they had knowledge, skills, and proper equipment to run classes online (Babinčáková & Bernard, 2020). In fact, a very recent study shows that technical and operation capabilities impact in a far-reaching way on users' behavioural intention to use the new technology (Shah et al., 2021). Therefore, educators should consider improving teachers' technology skills to promote the likelihood that effective teaching occurs in a technology mediated environment. Alhabeeb and Rowley (2018) suggest that training and workshops could be the key determinants in increasing teachers' technical skills and thus their operational ability.

Findings also suggest that *Perceived Ease of Use* has a statistically significant influence on teachers' *Behavioural Intention* to use Google classroom (H_6). This supports the findings of the original studies of the technology acceptance model undertaken by Davis (1989) and affirms the findings in recent studies about users' behavioural intention to use technology (Chocarro et al., 2021; Francom et al., 2021; Koksalmis & Damar, 2021).

Also, *Operational Ability* significantly mediates the effect of *Awareness* on teachers' *Perceived Use of Use* (H_{15}). This

indicates that teachers' *Awareness* of Google Classroom can inherently raise teachers' *Operational Ability*, cumulatively impacting on *Perceived Ease of Use* for using this platform. Furthermore, *Perceived Ease of Use* significantly mediates both the relationship of *Awareness* and *Operational Ability* with the *Behavioural Intention to Use* Google classroom (H_{36} and H_{56}). These findings clearly indicate that both *Awareness* and *Operational Ability* help teachers to develop a positive attitude towards using the technology and its *Perceived Ease of Use* positively influences their intention to use Google classroom.

As reported in the original TAM and other studies, perceived ease of use of technology can predict the users' attitudes and mediates users' behavioural intentions and actual usage of the technology (Lee & Heo, 2020). In a similar vein, direct and indirect effects of perceived ease of use play a significant role in users' behavioural intention to use the technology (Damerji & Salimi, 2021; Lazar et al., 2020). Thus, it is important for educators in the context of Bangladesh and Nigeria that the *Perceived Ease of Use* should be a key focus to be considered when integrating and adopting a new technology in the teaching-learning process. It is to be noted that, this study only used the TAM model to explore how a group of teachers are accepting a new technology i.e., Google classroom in managing the teaching-learning. The findings of this study do not ensure the effective use of Google classroom by the teachers.

This study also explores the impact of the country on the teachers' acceptance and use of Google classroom. The descriptive statistics reveal that teachers from the selected Bangladeshi university demonstrate a greater acceptance rate of Google classroom compared to their Nigerian counterparts (See mean values in Table 8). Specifically, Nigerian teachers struggle more in terms of Technology challenges ($M = 16.96$) compared to Bangladeshi teachers ($M = 8.074$). The MANOVA results (Tables 9 and 10) also reveal that the difference between the teachers of these two universities in terms of technology challenges is statistically significant. This finding is in line with the study of Davies et al. (2019) which revealed that poor ICT infrastructure, lack of teachers' skills and outdated resources are the fundamental reasons that affect Nigerian university teachers adversely in their technological development. This could also be due to the poor governance of the digitization of educational technology in Nigeria, a situation that has been the status quo for many years (Moses et al., 2018).

In brief, the results revealed statistically significant differences between the Bangladeshi and Nigerian teachers' opinions about *Operational Ability*, *Perceived Ease of Use* and *Behavioural Intention* to use the Google classroom. These results may provide an insight into the developmental progress of technology integration into the higher education system of these two countries. Both countries

are treated as developing economies by the United Nations (2020). Such countries generally have poor infrastructures and low education standards. However, when considering the sustainable development growth index, the percentage of SDG achievement scores shows Bangladesh is doing much better (63.45%) compared to Nigeria (48.93%) (SDG Report, 2021). Thus, a possible explanation that Nigeria is struggling in the SDG index, relates specifically to terms of technology integration resulting in low teacher acceptance of technology integration into their teaching practice. In addition, recent reports confirm that the poor state of the economy along with poor governance of technology, accompanied by inadequate facilities and training are challenging factors implicated in Nigerian teachers' inferior performance in technology use (Eze et al., 2018; Kola & Opeyemi, 2020; Moses et al., 2018; Udosen & Adie, 2019).

To conclude, the possible solution to improve teachers' attitudes and acceptance of Google classroom could reside in the provision of a regular training program that demonstrates how effectively the platform could be incorporated into the teaching process. In this regard, Anekwe and Amadi (2020) suggest that teachers should be adequately trained in using Google classroom to enhance the quality of their instruction. A similar recommendation was made by Patience et al. (2020) and Olufunke (2020); though teachers are aware of the potential benefits of Google classroom, they need to be regularly trained and retrained to ensure that they use it effectively. It is argued that the Google classroom enhances and promotes teaching and learning if the instructor learns how to produce the courseware effectively within its framework (Odewumi, 2020). Therefore, it is incumbent on university management to organise workshops, seminars, and conferences on Google classroom for effective teaching and learning in university environments.

Implications of the Study

This study provides some important practical insights about the Google classroom adoption and use by the teachers of these two universities in Bangladesh and Nigeria. It attempts to identify the status of teachers' attitudes towards accepting the new technology, a process that is particularly noteworthy in the context of restrictions imposed by COVID-19. Challenges facing the adoption of Google classroom are not only limited to the teachers' perceived use of the platform but also involve other external factors such as technology challenges, awareness, and operational ability. Therefore, the findings of this study offer valuable suggestions for educators, policymakers, teachers, and researchers on how the challenges of successful Google classroom integration into the educational system might be met.

Teachers' awareness can be readily improved if the technical resources are available and easy to access. Research shows that a teacher who recognises and realizes the potential of technology integration offers a better form of education compared to the traditional delivery method (Kulikowski et al., 2021). Thus, the findings of this study help administrations to emphasize the improvement of the technical skills and pedagogical knowledge of teachers for using the new technology by arranging training and workshops on Google classroom. These training sessions could motivate teachers to overcome the technology challenges they face while using the Google classroom platform. Further, high quality professional in-service is likely to increase the teachers' operational ability and efficiency in managing the Google classroom.

Also, education policymakers, specifically in the Nigerian context, need to adopt new policies and strategies to 'sell' to their instructors the value of the consistent use of Google classrooms and other available LMSs. They also need to ensure constant technical support for teachers to enable them to manage their courses online.

Limitations and Further Research Directions

This study has several limitations to consider while understanding the findings related to teachers' acceptance and behavioural intention to use Google classroom in the current study context. First, the key issue pertaining to the limitations to the findings in this study is the small sample size. The modest scale of this study may make it difficult to determine if a particular outcome is a true finding and in some cases a type II error may occur, i.e., the null hypothesis is incorrectly accepted and no difference between the study groups is reported (Boone et al., 2014). Research shows that a type II error skews the results, which decreases the power of the study (Shieh, 2019). We accept this limitation is inherent in the current study context; thus, we did not draw any general conclusions pertaining to the attitudes of all teachers in Bangladesh and Nigeria about the Google classroom. Future studies might adopt a larger sample to obtain more comprehensive insights into the teachers' opinions about Google classroom.

Second, as this study only focuses on a sample of teachers thus providing only a partial picture of its acceptance in the contexts of Bangladesh and Nigeria, future studies might consider both teachers and students to gain a more comprehensive understanding of Google classroom status in these two jurisdictions. Specifically, a recent study shows that Bangladeshi students are not ready to fully embrace the online learning during the pandemic (Al Mamun et al.,

2022). In addition, future studies could benefit from the use of mixed or qualitative methods to understand the dynamics of technology integration into the teaching learning process. Moreover, more external variables such as gender, self-efficacy, motivational factors might be added to the original technology acceptance model to investigate their impacts on teacher acceptance of Google classroom. Future studies could consider all these factors to further explore the results.

Third, the similarities established between the two universities based on socio-economic status and bilateral relations may not be a strong reason for comparison. Though the two authors have personal experience with these two universities, we acknowledge that it is based on the authors' subjective judgement which can be affected with bias. Specifically, recent reports show that the poor governance of technology, inadequate facilities and training are particularly prevalent in Nigerian universities that can affect the technology competence of Nigerian teachers (Kola & Opeyemi, 2020; Moses et al., 2018; Udosen & Adie, 2019). In contrast, Bangladesh is comparatively in a better situation in terms of technology adoption, productivity and professional development (The World Bank, 2021). Thus, the situations in the two universities may not be the same, and this difference might explain the differences in teachers' technical competency between these two universities, as Nigerian teachers demonstrate inferior technology skills reported in this study. Thus, we acknowledge it as a limitation of this study that the teachers in these two countries might not hold similar status in terms of technological skills related to the use of Google classroom.

Fourth, this study simply attempts to measure the teacher's acceptance and behavioural intention to use the Google classroom. It does not explain how effectively teachers are using Google classroom. Behavioural intention to use a particular technology tool may or may not have an influence on its effective use. Thus, this study fails to explore this important phenomenon of teachers' usage of Google classroom. Future studies might explore the relationship of TAM components with the effective use of technology in greater detail.

Finally, this study only considers the positive effect of *Awareness* in the technology acceptance model and infers that awareness is linked to an increase in the teachers' acceptance and usage of Google classroom. However, the literature suggests that the consequence of awareness can be both negative and positive (Fejfar & Hoyle, 2016; Krämer et al., 2017). Often awareness of another tool or strategies for working accentuates a negative effect i.e., anxiety, stress etc. and thus negatively affect the user's experience (Fejfar & Hoyle, 2016; Silvia & O'Brien, 2005). The current article did not consider these affective aspects of awareness about Google classroom and what effects it has on teachers' acceptance and adoption of Google classroom in their teaching practice. Future studies could integrate the negative aspects of awareness in the technology acceptance model

to explore how it impacts teachers' experiences and behavioural intentions to use the Google classroom.

Conclusion

Considering the COVID-19 situation, Google classroom provides an opportunity for teachers and students to continue teaching and learning in the distance mode. This study focuses on teachers' perceived understanding of the potential benefits of using Google classroom and their future intention to use it as the learning management system in two universities of Bangladesh and Nigeria. The situational comparison of the teachers of Bangladesh and Nigeria with respect to the use of Google classroom reveals that the challenges of technology acceptance in Nigeria are higher than that of Bangladesh. Lack of awareness, technology challenges, operational ability significantly impact teachers' attitudes towards perceived ease of use and their future intention to use the platform. The findings of this paper are important and particularly relevant at such a critical time with the restrictions of COVID-19 pandemic in play. These findings can inform educational institutions and assist policymakers to review and utilise their policies to promote technology integration thus ensuring the successful implementation of Google classroom.

Appendix: Initial version of the survey

Construct A: Awareness.

AW1: I learn that Google Classroom is easy to use for teaching-learning.

AW2: I am aware that due to collaboration Google Classroom students get to know their classmates.

AW3: I am aware that Google Classroom makes Co-educators /teachers to collaborate in undertaking a course.

AW4: I know that we can use Google Classroom for a blended learning and /or real time online class.

Construct B: Technology challenges.

TC1: Google Classroom does not run smoothly due to poor internet connection in my institution.

TC2: Our institution does not provide sufficient computer access point to students to use Google Classroom in their teaching and learning process.

TC3: Learning contents' preparation and delivery using Google Classroom takes much time.

TC4: Your school do not keep up with the rapidly changing technology for better learning.

TC5: Collaborative learning using Google Classroom in our institution fails due to unstable power supply.

Construct C: Operational ability.

OA1: I know how to set up and enrol students in my class using Google Classroom.

OA2: I know how to make post, upload, edit and monitor students' work.

OA3: I know how to assess/grade my students whenever they are issued a task.

OA4: I felt very confident in using Google Classroom with my students.

OA5: I needed to acquire a lot of skills before I could get going in using Google Classroom (R).

Construct D: Perceived ease of use.

PEU1: I used to find Google Classroom easy to use.

PEU2: Using Google Classroom would be easy for me.

PEU3: Interaction with Google Classroom would be easy for me.

PEU4: Finding information relating to Google Classroom would be easy for me.

PEU5: Collaboration with my students in Google Classroom would be easy.

Construct E: Behavioural intention to use.

BIU1: I intend to use Google Classroom during Summer Semester.

BIU2: I will return to using Google Classroom regularly.

BIU3: I intend to be a great user of Google Classroom.

BIU4: I intend to be given collaborative task to my students on Google Classroom.

BIU5: I intend to suggest to my colleagues to be using Google Classroom.

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Declarations

Ethics Approval This study is approved by Committee for Advanced Studies and Research (CASR), Islamic university of Technology (IUT), Bangladesh.

Conflict of Interest The authors declare no competing interest.

Informed Consent Informed consent was obtained from all individual participants involved in the study.

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