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Testing and Validating a Faculty Blended Learning Adoption Model

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Faculty members are crucial to Blended Learning's success in higher education. Despite substantial research into the elements that drive faculty adoption of BL, few have developed a model to explain how these factors combine and influence faculty intentions to teach in this mode. This study used data collected from 207 professors from 18 universities across Africa, the United States, Europe, and the Middle East to test and validate a Faculty Blended Learning Adoption Model which was derived from a Grounded Theory study. Four model constructs (institutional hygiene readiness, student BL disposition, faculty technology ready, and Pedagogy Technology Fit for BL) mediated by motivation were tested to predict faculty Blended Learning adoption using structural equation modeling. The results demonstrated an excellent model fit, with three of the six hypotheses in this study being supported. Faculty desire to utilize BL was found to be influenced by faculty technology readiness and task technology fit for BL, but not by institutional hygiene readiness or student BL disposition. This research presents a useful model for university administrators to use in their BL implementations. A thorough understanding of this model can assist decision-makers in identifying the factors that influence future faculty acceptance or resistance to blended learning, as well as helping them in enhancing acceptance and usage.

Keywords: blended learning, technology adoption, technology readiness, institutional readiness, motivation, pedagogy

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INTRODUCTION

The difficulty that faculty members have had in adopting Blended Learning (BL) in Higher Education Institutions (HEIs) has been thoroughly researched for many years (Callo and Yazon, 2020). In Ghana and elsewhere (Adarkwah, 2021), it is frequently asserted that BL has the ability to change academia and become the new normal for teaching and learning (Blieck et al., 2020). While this is so, faculty members are very slow in adopting BL implemented within the universities

(Martin et al., 2019b). The key role faculty members play in the failure or successes in its implementation is well documented (Martin et al., 2019b). It is this concern over the failure of faculty members to adopt BL for teaching and learning that has generated the copious literature on the challenges of BL adoption (Aboagye et al., 2020). The ability to thrive in teaching in BL mode environment requires instructors to go through a learning curve, thus simply being a great teacher in a traditional face-to-face classroom is not enough (Albrahim, 2020). Only a few teacher education programs focus on the skills, methodologies, and techniques required for online teaching (Archambault and Larson, 2015; Rahmawati et al., 2021). As a result, many faculty members lack both theoretical and practical understanding of teaching and learning online (Adiyarta et al., 2018).

For this article, the journey to understand faculty BL adoption begun when the management of a public institution X in Ghana decided to update faculty teaching requirements to include having the competencies to teach in blended mode through acquiring BL certification at the university's center for online learning and teaching. This led to an inquiry to investigate the barriers of faculty BL adoption after a management report detailed faculty reluctance to teach online despite considerable investment made in the acquisition of a learning management system (Moodle) and the retooling of the curriculum to accommodate BL. Additionally, the author wondered what students' experience of BL was in the wake of the low faculty adoption, and thus conducted a GT using the experiences of the faculty members teaching BL to develop a faculty blended learning adoption model. Whiles most traditional HEI programs require an integration of technology into teaching and learning, there has been a less than commensurate effort on the part of management to ensure faculty members acquired the requisite competencies required for BL teaching and learning (Anthony Jnr, 2021). To this extent, there is minimal understanding of the elements that guide faculty preparation toward implementing a campus wide blended learning environment (Graham et al., 2019).

The purpose of this study is to test and validate the Faculty Blended Learning Adoption Model (FBLAM; Antwi-Boampong, 2020) and to explain the factors that motivate faculty toward adoption of BL. The constructs contained in this model were drawn from an exploratory Grounded Theory study Antwi-Boampong (2020) that modeled the lived experiences of faculty members' BL adoption. According to the findings, teachers' knowledge and abilities may be better understood, allowing for more targeted and customized professional development opportunities to better prepare educators for teaching in mixed contexts (Graham et al., 2019). The principal question this article asks is: what is the effect of the predictors of the constructs of FBLAM mediated by motivation on BL adoption within the HEI? The paper begins with an account of the antecedents of the FBLAM, then moves on to discuss the constructs empirically before discussing the formulation of the hypothesis. Thereafter, the methodology and the findings for the study are presented. We conclude by arguing for adopting the FBLAM as an empirically tested and validated model for BL adoption by HEIs.

LITERATURE REVIEW

To get a better understanding of the elements that impact faculty BL adoption, previous literature looked at BL research in the context of models that have shown promise in predicting faculty adoption.

Institutional Hygiene Readiness

A framework has been created to assist higher education institutions in making the move to improved blended learning. The suggested framework by Adekola et al. (2017) tackles the why (change agents), what (institutional concerns), how (organizational readiness), and who (stakeholders) of improved blended learning transitions. A successful institutional shift into improved blended learning necessitates the participation of all stakeholder groups (Adekola et al., 2017). Supportive factors, attitude, learning style, contentment, course management, and simplicity of use all positively impact learners' and academic staffs' perceptions of BL adoption. Similarly, studies show that faculty attitude toward BL adoption is influenced positively by strategy, structure, and support factors (Anthony et al., 2019). The findings support higher education institutions to plan and initiate BL policies. Anthony Jnr (2021) provides insights on BL from an institutional theory perspective. It was discovered that faculty members' adoption of BL is strongly impacted by coercive, normative, and mimetic influences. In addition, the research highlighted institutional initiatives that have an impact on BL implementation. Institutional hygiene readiness represents the preparedness of the institution toward providing an environment that is conducive enough to motivate faculty to want to use BL for teaching and learning. This is confirmed in previous research (Machado, 2007; Wong et al., 2014; Rahmawati et al., 2021). The following primary hypotheses is tested in the current study, which is based on empirical data across a variety of jurisdictions.

H_{a1} – IHR significantly influences BL adoption.

H_{a2} – IHR significantly influences BL adoption mediated by motivation.

Faculty Technology Readiness

This construct describes a set of implicit factors that are primarily related to the personal attributes of the faculty members needed as pre-requisite for BL delivery. These include the technological competences of faculty members which are requisites for instructional design and delivery of BL contents. According to Mercado (2008),Cutri and Mena (2020), and Legaspi et al. (2021) several colleges use a readiness technique to assess faculty technology readiness to teach online, however, the majority have not been properly investigated or experimentally evaluated. Only a few studies have investigated whether faculty members are ready to teach online. Junus et al. (2021) looked at how online instructors' e-learning readiness was assessed before, during, and after the course was delivered. They discovered that online instructors had a pressing need for online support desk services. Faculty members do not feel well prepared to teach online (Martin et al., 2019a,c). However, identifying competences to equip faculty to teach online remains a priority, and by doing so, we will be able to provide recommendations on how to teach in BL mode. Callo and Yazon (2020) looked at teacher educators' readiness and preparation for, as well as their perspectives of preservice teacher preparation. Martin et al. (2019b) define *faculty readiness to teach online* "as a state of faculty preparation for online Teaching." In the context of this study, we are particularly interested in two elements of readiness: (1) faculty attitudes toward the relevance of online teaching, and (2) faculty views of their technological competence to teach online confidently. Faculty Technology-Readiness refers to an individual's readiness to make use of new technology in the course of their work (Parasuraman, 2000; Cutri and Mena, 2020). Thus, the following hypotheses are proposed:

H_{a3} – Faculty technology readiness significantly influences BL adoption.

H_{a4} – Faculty technology readiness significantly influences BL adoption mediated by motivation.

Student's Disposition to Accept Blended Learning

As opposed to teaching presence in non-BL situations, it is the student disposition that has a bigger effect over teaching presence in BL environments (Sangwan et al., 2021). Comparing web-based technologies to conventional classroom learning, despite their extensive use, web-based technologies still confront the difficulty of not being readily accepted when presented into a new application scenario (Adarkwah, 2021). Individual differences exist in students' dispositions and preparedness to embrace and use web-based learning tools, as well (Geng et al., 2019). During the learning situations, students' attitudes about technology-based applications reflect their level of technological preparedness (Legaspi et al., 2021). Cheon et al. (2012) discovered that college students' attitudes about mobile learning had a favorable impact on their intention to use mobile learning. In the FBLAM setting, a good attitude about using online learning resources among students will encourage faculty to teach in BL mode and achieve the desired learning outcome (Antwi-Boampong, 2020; Al-Ayed and Al-Tit, 2021).

It has already been stated that the usage of learning technologies has a variety of effects on students' learning outcomes, with some of these effects being produced by contextual and cognitive variables and others being driven by technological factors alone (Hong et al., 2014; Sangwan et al., 2021). In science education, it has been discovered that a BL atmosphere improves student attendance and learning pleasure (Tang, 2013). Students' intellectual development can also be enhanced by utilizing online course materials (Teo et al., 2019). Students' views and behaviors are influenced by a variety of factors, which is why it is important to investigate their preparedness for learning technologies as well as their impacts on their perceptions and behaviors. According to Parasuraman (2000) and Tubaishat and Lansari (2011), a measurement scale for technology readiness was developed and validated, and it consisted of 28 items that were divided into four categories: optimism, innovativeness, discomfort, and insecurity. Parasuraman (2000) found that the Technology Readiness Index (TRI) was effective in identifying individuals who were technologically ready. Each of these four categories reflects the individual's attitude toward new technology in the context of the learning process in its whole (Parasuraman, 2000). The following hypotheses are proposed:

H_{a5} – Student disposition to adopt BL significantly influences BL adoption.

H_{a6} – Student disposition to adopt BL significantly influences BL adoption mediated by motivation.

Pedagogy-Technology-Fit

This construct is operationalized through dimensions of fit that consider: (1) the underpinning ontology of the domain, (2) the purpose of the task that the representation is meant to support, (3) how best to support the cognitive processes of the users of the representations, (4) users' differing needs and preferences, and (5) the tool and environment in which the representations are constructed and manipulated (Masterman and Craft, 2013). To explore the extent to which it is possible to describe all the parts of a domain being described, as well as the connections between them, for problem-solving purposes, Masterman and Craft (2013) uses the phrase "ontology-fit." Faculty technology readiness to teach online is defined as the level of faculty preparedness for online teaching because of technological advances. Specifically, in the context of this study, we will be focusing on two elements of preparedness: (1) faculty attitude on the importance of online teaching and (2) faculty competences and implicit ability to confidently teach online using technology. The hypothesized relationship of P-T-F is drawn from related literature and discussed below. The FBLAM proposes in line with similar studies (Okojie et al., 2006; Dennehy et al., 2016) that the P-T-F has a positive influence on faculty motivation to adopt BL (that is the better the pedagogy used for teaching fits or is compatible with the technology employed to deliver BL courses, the more positive the anticipation that faculty would teach in blended mode). In the context of BL, the anticipated benefits would include faculty being able to deliver courses to students more easily, quickly to improve their learning outcomes.

There have been several models in the literature developed to help organizations understand how individuals make use of technology (Susanto et al., 2020). A model for task–technology fit was created by Goodhue and Thompson (1995) to predict performance, with the idea of task–technology fit serving as a predictor. It has been studied what influence task–technology fit has on various domains by employing various elements of the Technology to Performance Chain (TPC). For the first time, McGill and Klobas (2009) used the technology to performance chain as a framework to investigate how task–technology fit affects the performance impacts of learning Management Systems (LMSs). Several findings (Fathema et al., 2015; Junus et al., 2021) offered significant evidence for the relevance of task–technology fit, which affected perceived impact on learning both directly and indirectly by the degree to which it was utilized. The role of pedagogy–technology fit in the BL domain has not yet been thoroughly studied (Dennehy et al., 2016). As a result, given the need for thorough study into the variables that affect faculty BL adoption, determining the relevance of the PTF might be a useful construct for determining the elements that drive faculty BL adoption. Based on the empirical findings the current study tests the following principal hypotheses:

H_{a7} – PTF significantly influences BL adoption.

H_{a8} – PTF significantly influences BL adoption mediated by motivation.

Teaching Motivation

According to the findings of faculty adoption research (Martin, 2010; Reeve, 2015; Garrote and Pettersson, 2016), motivation is a critical component in both online and in-class learning environments. Teaching motivation is the process through which goal-directed action is started and sustained, and it is represented in personal involvement as well as cognitive, emotional, and behavioral engagement in learning activities (Chen and Jang, 2010; Nikou and Economides, 2017). According to Hoffman (2013) both extrinsic and intrinsic variables are associated with faculty members' desire to participate in online education in a favorable and statistically significant way. Some intrinsic variables include a faculty member's opinions about the effectiveness of online education and their desire to broaden student access to higher education opportunities (Hartnett, 2016). A faculty member's willingness to participate in online education was found to be the most important factor in their willingness to teach online courses (Sørebø et al., 2009). Intrinsic factors, including belief in the efficacy of online education and desire to increase student access to education, were found to have the strongest impact (Hoffman, 2013). Although much educational research (Pereira and Figueiredo, 2010; Gautreau, 2011; Maldonado et al., 2011) emphasizes on motivation, the effect of pedagogy-technology-fit, students BL disposition, institutional hygiene readiness and faculty technology readiness have not been explored in the blended learning setting (Antwi-Boampong, 2020).

The FBLAM (Antwi-Boampong, 2020), as illustrated in **Figure 1**, which presents hypothesized relationships between pedagogy-technology-fit, students BL disposition, institutional hygiene readiness and faculty technology readiness in predicting faculty adoption is tested.

Table 1 presents the model constructs and descriptions that explains them.

METHODOLOGY

Design and Participants

The study used a correlational study design, which is consistent with previous studies undertaken to assess the BL adoption (Lin and Wang, 2012). MacDonald and Reid (2013) proposed a sample size determination-based chi-square for specified confidence interval at 1 degree of freedom on a population

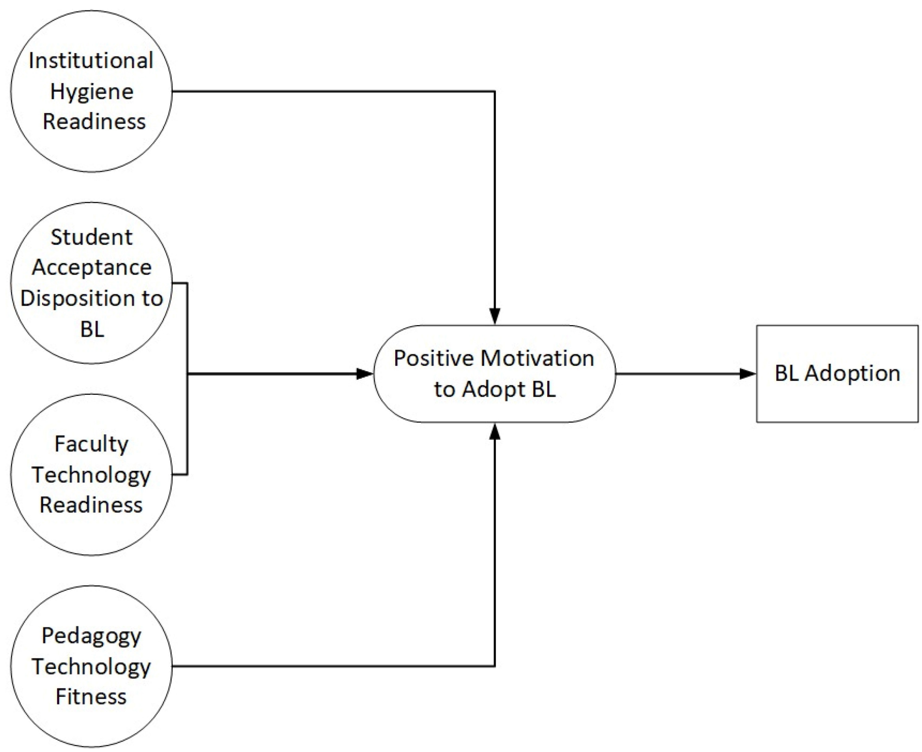

FIGURE 1 | Faculty blended learning adoption model [adopted from Antwi-Boampong (2020)].

(N) of respondents. At a significance level of 5%, a closed ended questionnaire was administered to a sample of 207 from a population of 500 university lecturers and faculty administers and officers who have between 1 and 10 years' experience in BL across 19 universities in six countries (Ghana, Namibia, Dubai, United States, Denmark, and Kuwait). Only lecturers and faculty members who been part and have experienced BL approach between 1 and 10 years met the selection criteria. The questionnaire was used to test the hypothesized model. Nearly all participants had taught courses in Science, Arts, Education, Engineering, Management, and other related courses. The mean length of teaching among participants was 8.5 years with a standard deviation of 0.7 years.

Data Analysis

Principal Component analysis and Structural equation modeling (SEM) approach were used as tools for data analysis using multivariate statistical approach of partial least squares. Sarstedt et al. (2014) confirmed that this technique is normally recommended when the aim is to confirm a theory from the constructs and the sample size is somewhat small. All constructs of the measurement model in **Figure 1** as well as the mediation are based on the theoretical survey and can be categorized as reflective (Hair et al., 2012). For such measurement models, we use constructs validity (discriminate validity and convergent validity) and reliability analysis (Sarstedt et al., 2014). The reliability of internal consistency was analyzed by composite reliability and Cronbach's Alpha, and both exceeded the threshold of 0.7 (Sarstedt et al., 2014). To establish how well the collected data measures the construct of the study, psychometric properties, including Principal Component Analysis (PCA), reliability and confirmatory factor analysis (CFA) tests were carried out, as proposed by Anderson and Gerbin (1998). Principal component analysis with Varimax rotation was also carried out to remove statements that did not significantly contribute to the constructs as such all constructs with underlying statements entered the PCA.

TABLE 1 | Model construct summary.

Model constructs	Description
Institutional hygiene readiness	It represents the preparedness of the institution toward providing conducive environment to motivate faculty to want to use BL for teaching and learning. For instance, the availability of appropriate infrastructure, technology and policies that engender an ICT culture in the institution. This is confirmed in previous research (Machado, 2007; Whelan, 2008; Wong et al., 2014).
Faculty technology readiness	Level of technology efficacy or skills and how faculty members plan teaching to ensure that the pedagogic approach fits well to achieve the learning outcomes (Geng et al., 2019; Cutri and Mena, 2020; Sangwan et al., 2021).
Students' BL disposition	Relates to attributes within the BL environment that positively stimulate students' disposition to want to engage in learning in BL mode. For example, ease of use of the system and access to technical support.
Pedagogy technology fit	It is the alignment of teaching to attain a balance with online environments to achieve desired learning outcomes (Goodhue and Thompson, 1995; McGill and Klobas, 2009).
Positive motivation to adopt BL	The outcome derived from the influences of independent constructs that lead to a decision to adopt BL (Gautreau, 2011; Ibrahim and Nat, 2019).
Motivation confirmation	The stage where a decision to adopt BL for teaching is confirmed and faculty begin to use BL for teaching and learning.

DATA ANALYSIS

Introduction

The section presents and discusses the results in line with the hypothesized model. Six constructs with 26 items were used as independent variables to predict BL adoption mediated by motivation. Prior to that, descriptive statistics were used to measure the weight for each of the constructs based on the Likert scale. This was then followed by a path analysis (confirmatory factor analysis). The results from the path analysis were presented and passed through PCA to remove the items which could not load more than 0.5. Cronbach's Alpha was used to further confirm

TABLE 2 | University/Institution.

Institution	Frequency	Percent
University of Ghana	2	1.0
University of Cape Coast	9	4.3
Kwame Nkrumah University of Science and Technology	3	1.4
Methodist University College	9	4.3
University for Development Studies	9	4.3
International University of Management-Namibia	78	37.7
Aalborg University–Denmark	6	2.9
The University of North Carolina at Chapel Hill-United States	20	9.7
West Chester University of Pennsylvania	3	1.4
United Arab Emirates University-Dubai	3	3
Southern Illinois University-United States	3	3
Chicago State University	6	2.9
Ohio University-United States	3	1.4
University of Texas at Austin	3	1.4
University of North Texas at Dallas-United States	3	1.4
American University of Kuwait-Kuwait	3	1.4
GCC National	3	1.4
AAMUSTED-Ghana	3	1.4
Ghana Communication Technology University	38	18.4
Total	207	100

Source: Field Data (2021).

TABLE 3 | Years of teaching experience.

	Frequency	Percent	Valid percent	Cumulative percent
1–5	78	37.7	37.7	37.7
6–10	48	23.2	23.2	60.9
11–15	45	21.7	21.7	82.6
16–20	24	11.6	11.6	94.2
20+	12	5.8	5.8	100
Total	207	100	100	

Source: Field Data (2021).

the results and a re-specified model was developed and tested. Composite Reliability and Average Variance Extracted were used to further test the reliability and validity of the constructs, respectively. A path analysis was conducted for the re-specified model with model fitted test to demonstrate the rigorousness of the model. Finally, the results from the test were discussed and validated in the literature with the conclusions and implication of the study clearly elucidated.

Presentation of Results

Demographic Information

Table 2 illustrates the distribution of the institutions or universities of the respondents. Out of the total number of respondents, 37.7% represented respondents from the University of Namibia, 18.4% from the Ghana Communication Technology University and 9.7% represented The University of North Carolina at Chapel Hill. The Methodist University, University for Development Studies, and the University of Cape Coast had 4.3% responses. Aalborg University and University of Chicago both had 2.9 responses. All other universities had a total of 1.4%. The implication is that three times as many foreign universities participated in the survey as did local universities.

Table 3 below illustrates the teaching experience of the respondents from the surveyed universities. Out of the total number of respondents from the universities, 37.7% had 1–5 years of experience, 23.2% had taught between 6 and 10 years, 21.7% had 11–15 years teaching experience, 11.6% had taught from 16 to 20 years, whilst 5.8% had 20+ years teaching experience. The implication is that majority of the teachers had between 1 and 10 years teaching experience.

Table 4 shows a cross tabulation of the number of years' respondents had in teaching courses using blended learning approach. The category of 1–5 years had majority of lecturers (74%) with BL experience who had taught between 1 and 20 years cumulatively. The other 26% of lecturers had BL experience between 6 and 20 years with same teaching experience. This finding suggests most lecturers acquired the BL experience in this recent past 5 years, indicating the level of adoption of BL in these universities studied in this last 5 years.

Descriptive Analysis

The weighted mean and standard deviation for Institutional Hygiene Readiness for BL adoption accounted for 2.36 and 1.13, respectively (*with a 5-point Likert scale 1-Strongly Agree, 2-Agree, 3-Neutral, 4-Disagree, and 5-Strongly Disagree*). The mean shows that averagely all respondents agreed that Institutional Hygiene Readiness contributes to BL adoption. The standard deviation shows the level of dispersion of respondents' views with regards to Institutional Hygiene Readiness to the adoption of BL (see **Table 5**). The standard deviation of 1.13 shows a fair spread of the other views around the mean. The implication is that majority of the respondents agreed that Institutional Hygiene Readiness contributes significantly to BL adoption. Also, the weighted mean and standard deviation for Student Acceptance Disposition of BL adoption accounted for 2.16 and 0.92, respectively (see **Table 5**). The mean shows that averagely all respondents agreed that Student Acceptance Disposition of BL is a key construct which contributes to BL adoption. The standard deviation shows a good estimation of the mean indicating that very few people have diverse opinions of the contribution of the construct to BL adoption. Faculty Technology Readiness of BL adoption accounted for 2.27 and 0.99 on the weighted mean and standard deviation, respectively (see **Table 5**). The mean shows that averagely all respondents agreed that Faculty Technology Readiness contributes largely to BL adoption. The standard deviation shows a good estimation of the mean. The weighted mean and standard deviation for Pedagogy Technology Fit of BL adoption accounted for 2.18 and 0.99, respectively (see **Table 5**). The mean shows that averagely all respondents agreed that Pedagogy Technology Fit of BL contributes largely to BL adoption. The standard deviation shows a good estimation of the mean, depicting very few people had diverse opinions of the contributions of the Pedagogy Technology Fit to BL

TABLE 4 | Years of teaching experience × years of blended learning teaching cross tabulation.

		Years of blended learning teaching				Total
		1–5	6–10	11–15	16–20	
Years of teaching experience	1–5	78	0	0	0	78
	6–10	24	24	0	0	48
	11–15	27	12	6	0	45
	16–20	15	0	3	6	24
	20+	9	0	0	3	12
Total		153	36	9	9	207

Source: Field Data (2021).

TABLE 5 | Descriptive statistics of model construct.

Model construct	Weighted Mean	Standard Deviation
Institutional hygiene readiness	2.36	1.13
Student acceptance disposition for BL adoption	2.16	0.92
Faculty technology readiness	2.27	0.99
Pedagogy technology fit	2.18	0.99
Motivation to adoption blended learning	2.53	1.01

Source: Field Data (2021).

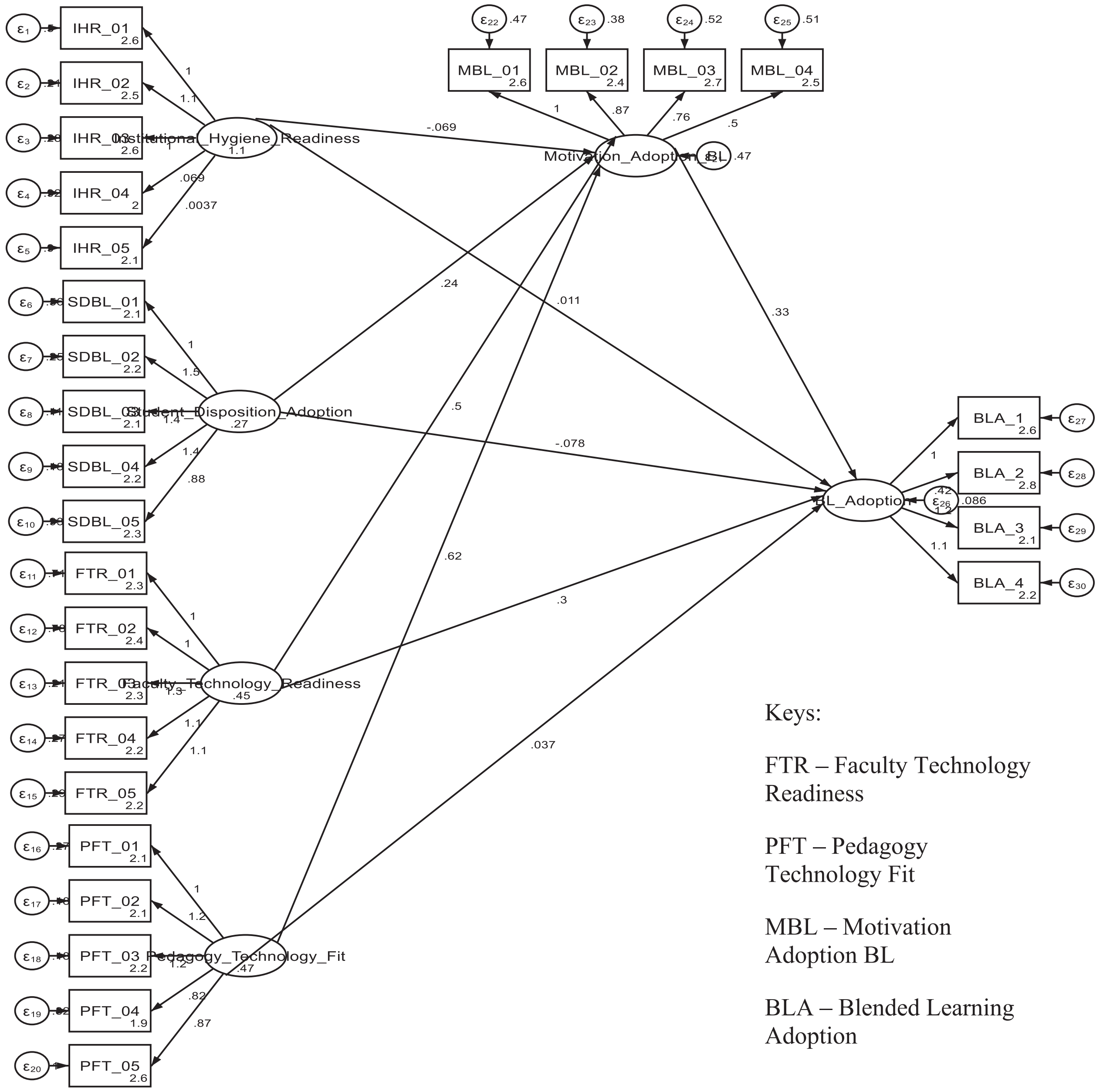

FIGURE 2 | Hypothesized model structural equation model. Source: Field Data (2021).

adoption. Motivation to Adoption Blended Learning of BL adoption accounted for 2.53 and 1.01, respectively, for mean and standard deviation (see **Table 5**). The mean shows that averagely all respondents agreed that Motivation to adopt BL significantly affects BL adoption.

Measurement of Constructs

The PCA was used to prune the variables in the hypothesized model to measurable constructs. This was to ensure that a rigorous process of measuring the model constructs was achieved. First a confirmatory factor analysis was conducted based on the hypothesized model. Then constructs with factor loadings less than 0.5 were removed, and further confirmed using Cronbach's Alpha. Those constructs which passed the threshold of 0.7 were regrouped and a new model re-specified with the regrouped variables. The re-specified model was further tested using the path analysis and confirmed with the goodness of fit.

Hypothesized Model

Figure 2 shows the hypothesized model showing the constructs for the independent variables, mediating variables and the dependent variables. The results of the hypothesized model

TABLE 6 | Hypothesized model.

Hypothesis	Path coefficient (β)	Sig. (α < 0.05)	Remarks
Institutional hygiene readiness = > motivation	−0.07	0.22	Not supported
Student acceptance disposition = > motivation	0.24	0.11	Not supported
Faculty technology readiness = > motivation	0.50	0.01	Supported
Pedagogy technology fit = > motivation	0.62	0.01	Supported
Motivation = > BL adoption	0.33	0.01	Supported
Institutional hygiene readiness = > BL adoption	0.01	0.75	Not supported
Student acceptance disposition = > BL adoption	−0.08	0.39	Not supported
Faculty technology readiness = > BL adoption	0.30	0.01	Supported
Pedagogy technology fit = > BL adoption	0.37	0.68	Not supported

TABLE 7 | KMO, Bartlett's test, Cronbach's alpha and component matrix.

Variable	KMO	Bartlett's test	Cronbach's alpha	Component matrix	
Institutional hygiene readiness	0.679	0.001	0.729	IHR_01	0.905
				IHR_02	0.941
				IHR_03	0.929
				IHR_04	0.077
Student acceptance disposition for BL adoption	0.835	0.001	0.835	SDBL_01	0.700
				SDBL_02	0.879
				SDBL_03	0.900
				SDBL_04	0.881
				SDBL_05	0.558
Faculty technology readiness	0.788	0.001	0.860	FTR_01	0.750
				FTR_02	0.739
				FTR_03	0.875
				FTR_04	0.829
				FTR_05	0.831
Pedagogy technology fit	0.729	0.001	0.829	PFT_01	0.828
				PFT_02	0.871
				PFT_03	0.886
				PFT_04	0.673
				PFT_05	0.643
Motivation to adoption blended learning	0.781	0.001	0.825	BML_01	0.864
				BML_02	0.866
				BML_03	0.812
				BML_04	0.688
Blended learning adoption	0.658	0.001		BLA_1	0.578
				BLA_3	0.595
				BLA_4	0.604
Weighted average	**0.762**	**0.001**	**0.812**		

Source: Field Data (2021).

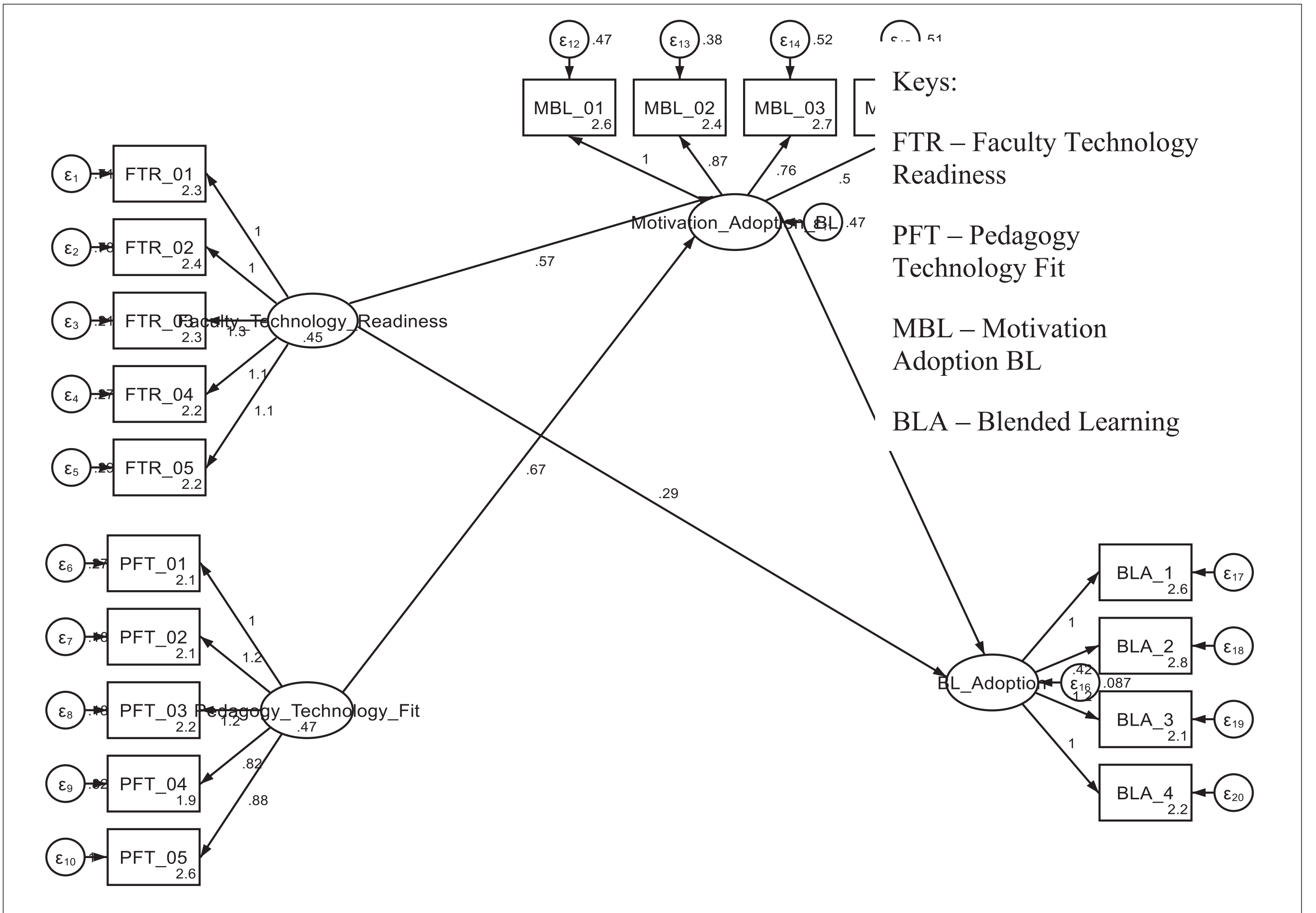

FIGURE 3 | Re-specified model. Source: Field Data (2021).

revealed that *Institutional Hygiene and Readiness, Student Acceptance Disposition, Pedagogy Technology Fit could not predict or explain BL adoption directly (see* ***Table 6****)* except *Faculty Technology Readiness* which predicted *BL adoption* (see **Table 6**). However, *Institutional Hygiene and Readiness and Student Acceptance Disposition* could not predict the mediating for (Motivation). But Faculty *Technology Readiness and Pedagogy Technology* could explain or predict the mediating factor (Motivation). As a result of these findings the study further conducted a PCA, Component Reliability and Average Variance Extracted test to ensure accuracy of the items measuring the constructs. A re-specified model was developed at the end of the test (see **Table 7** and **Figure 3**).

Principal Component Analysis: KMO, Bartlett's Test, Reliability and Validity

All constructs passed the Bartlett's test of sphericity with an average 0.01 ($\alpha < 0.05$) and Kaiser-Meyer-Olkin (KMO) average score of 0.762 was achieved which indicates suitability of the sample for factor analysis (see **Table 7**). As Hair et al. (2012) clarified, a factor loading scores higher than 0.5 for all items stated the satisfactory explanations of the item. Majority of the constructs (except two) had factor loadings greater 0.5. Constructs with factor loadings less than 0.5 were removed from the item list. The analysis reconfirmed twenty-six factors with a cumulative weighted average total variance explained of 67% (see **Table 7**). The twenty-six items were rotated in the Rotated Component Matrix and results highlighted (see **Table 7**). From the **Table 7** below, results show a different grouping of items, measuring the construct and these new item groupings were further tested with Cronbach's Alpha. The Cronbach's Alpha showed an average Alpha value of 0.812 which is greater than the threshold of 0.7 as postulated by Hair et al. (2012), demonstrating the consistency in the responses elicited from the respondents.

A Composite Reliability score of 0.85 was generated; indicating the internal consistency of six (6) constructs with twenty-six rotated items using Microsoft Excel to compute the CR score. The Average Variance Extracted score of 0.62 was also accounted, which was higher than 0.5 recommended by Hair et al. (2012) indicating convergence validity. Likewise, the value of AVE below 0.5, showed the degree to which the operationalization of a construct dissimilar, confirming the existence of discriminate validity. From the results obtained, these requirements were not violated as indicated by Hair et al. (2012).

TABLE 8 | Re-specified model.

Hypothesis	Path coefficient (β)	Sig. (α < 0.05)	Remarks
Faculty technology readiness = > motivation	0.57	0.01	Supported
Pedagogy technology fit = > motivation	0.66	0.01	Supported
Motivation adoption BL = > BL adoption	0.33	0.01	Supported
Faculty technology readiness = > BL adoption	0.29	0.01	Supported

TABLE 9 | Goodness-of-fit.

Measurement	Fit indices hypothesized model	Fit indices re-specified model	Threshold	Remarks
Standardized Root Mean Squared	0.06	0.03	<0.8	Hu and Bentler (1999) and Kenny et al. (2015)
Comparative Fit Index (CFI)	0.68	0.85	>0.95	Byrne and van de Vijver (2010), Hair et al. (2012), Kline (2013), and Mahmoud and Khalifa (2015)
Tucker-Lewis Index (TLI)	0.65	0.86	>0.9	Byrne and van de Vijver (2010), Hair et al. (2012), Kenny et al. (2015), and Mahmoud and Khalifa (2015)

Source: Field Data (2021).

TABLE 10 | Direct, indirect and total effects of re-specified model.

Measurement	Direct effect	Indirect effect	Total effect
Faculty technology readiness = > motivation	0.57	0.19	0.22
Pedagogy technology fit = > motivation	0.67	0.22	0.22
Motivation adoption BL = > BL adoption	0.033	–	0.33
Significance level	0.01	0.01	0.01

Source: Field Data (2021).

Re-specified Model

The re-specified model (see **Figure 3**) revealed that Faculty Technology Readiness contributed 29% at a significant level of 0.05 on BL Adoption in the universities studied remained as the only construct that directly predicted BL Adoption without any mediation (see **Table 8**). Pedagogy Technology Fit could not predict BL Adoption but could predict BL adoption when mediated by Motivation for BL Adoption (see **Table 8**). Motivation for BL Adoption remained a direct predictor of BL Adoption as indicated earlier in the hypothesized model (see **Table 8**).

Generally, a **goodness-of-fit test** is a measure of how well observed data correspond to the fitted model. Kenny et al. (2015) noted that goodness-of-fit refers to how a hypothesized model reproduces the multivariate structure of a given set of the data. A goodness-of-fit index allows a researcher to claim that the model is a good one or that a mis-specified model is not necessarily a bad model.

The study examined the measurement model's goodness-of-fit based on research objectives and hypothesized model (Little et al., 2002). The model was re-specified to reduce complexity and likelihood of unwanted interaction and effects between the variables (Taylor and Mackinnon, 2008).

The study reported multiple fit indices as appropriate (Cabrera-Nguyen, 2010) to be able to make a claim of its model fit. The fit indices demonstrate the level of rigorousness of the model after re-specification. Even though some constructs did not exceed the threshold mark, however, there was some level of improvement in the fit indices (see **Table 9**).

Baron and Kenny (1986) identified a direct effect (full mediation) and a case of both direct and indirect effects (partial mediation), which was confirmed by Zhao et al. (2010). In this study, both full and partial mediation were observed where Motivation to Adoption BL mediates between the independent constructs (Faculty Technology Readiness and Pedagogy Technology Fit) and BL Adoption. While a full mediation (direct effect) was observed between Faculty Technology Readiness and BL Adoption, a partial-mediated effect was observed between Pedagogy Technology Fit and BL Adoption. The study observes a total effect of 22% each for both Faculty Technology Readiness and Pedagogy Technology Fit on BL Adoption (see **Table 10**). The implication is that the factors (Faculty Technology Readiness and Pedagogy Technology Fit) that contribute to BL Adoption in the universities studied positively contribute 22% in total.

DISCUSSION OF RESULTS

The aim of this study was to test and validate the FBLAM and to explain the constructs that influence faculty to adopt BL. Overall, the findings in this study show empirical support for the hypothesis that the four independent constructs can predict the effects on faculty motivation to adopt BL. As a result of these findings, the proposed model appears to be a good match in that it provides an acceptable description of the interactions among the elements that impacted faculty intentions to utilize BL for teaching and learning.

From the results of the hypothesized model, institutional hygiene readiness and student acceptance disposition to accept BL could not predict or contribute directly to faculty motivation. Whereas studies (Porter et al., 2014; Mestan, 2019) suggest that institutional readiness and students disposition to BL are relevant factors to successful adoption of BL what could account for these constructs not finding predictive support from the model could be the case that respondents are from institutions with mature implementation/growth stages of BL implementations (Graham et al., 2013). The result is that most respondents are confident in their abilities and understand the importance of BL learning in the process of facilitating the learning experience for their pupils. The institutional structures and processes for faculty members are being supported in this respect to establish the most effective and suitable approaches to integrate BL throughout the Universities.

However, in the re-specified model, faculty technology readiness and pedagogy-technology-fit had direct influence on faculty motivation to adopt BL. These are consistent with current research (Goodhue and Thompson, 1995; McGill and Klobas, 2009; Archibald et al., 2021). From the direct influences of faculty technology readiness and its positive effect on motivation to adopt BL, it is useful to infer that when faculty members have the implicit technology competences to design and use instructional technology, they have positive feelings to teach in BL mode. These feelings according to Teo (2011) reinforce faculty motivation to use technology. Pedagogic Technology Fit had a direct influence on motivation of faculty to adopt BL (i.e., $\beta = 0.66$, α-value = 0.01). This affirms the fact that the pedagogy used must have positive significance within the domain in which the instruction activities are conducted using technology as a medium to promote the teaching and learning (Lee et al., 2017). Consequently, there is a practical implication for HEIs to provide continuous training and development to equip faculty in their teaching experiences.

Poor pedagogy technology fit discourages some instructors from using the LMS (Martin et al., 2019a). When teachers perceive that the instructional method can adequately fit the medium (technology) being employed this can strengthen their intention to adopt the technology in this case (LMS) as the domain to teach in BL mode (Martin et al., 2019b). Similarly, motivation had a direct influence of faculty BL adoption. This is consistent with studies by Gautreau (2011) and Ibrahim and Nat (2019). As a result of the validation of the motivation as an essential mediating element for BL implementation, both the extrinsic and intrinsic motivational variables have a significant beneficial impact on instructors' motivation to adopt BL in higher education institutions. Furthermore, it is critical for every higher education institution to assess their instructors' motivation about any kind of technology before considering its ultimate adoption. This model can serve as a foundation in this regard, and higher education institutions are free to investigate and include any other factors that they believe would increase their instructors' motivation in the BL setting (Ibrahim and Nat, 2019). Again, there is a policy implication for this finding. The finding affirms that higher education institutions readiness and support have provided diverse motivation to utilize technology to teach. Hence, institutions must enforce the policy to enhance the effective usage of the technology that can promote quality teaching and learning within the blended learning environment.

CONCLUSION

Results of our study indicate the effects of institutional hygiene preparedness, faculty technology readiness, student disposition to BL and pedagogic technology fit, which are mediated by motivation, on the faculty's willingness to embrace BL. This work contributes to the body of knowledge about blended learning and the elements that influence it, which has not been adequately examined previously. By examining the effects of these separate variables on faculty adoption, our research provides empirical data and insights for educators to better understand faculty adoption of BL to improve teaching and learning, ultimately leading to higher learning outcomes. The findings of this investigation indicate that the suggested model provides a satisfactory match to the data set under consideration. Future study might examine if the model is invariant across different personal (e.g., gender, computer experience), organizational, and technical variables, among other things. It may be possible to discover the culture-invariant characteristics that impact teachers' intentions to employ technology through comparative research across nations or cultures.

Recommendation

The literature gaps identified in this study suggests the lack of operationalized model for faculty BL adoption in the Ghanaian Higher Institution of Learning. It is recommended that the hypothesized and tested model extended to include other variables to explain other relevant issues mitigating the adoption and implementation of BL in higher institutions in Ghana. The findings present deep insights to guide policy implementation on BL adoption among the universities in Ghana and beyond. Further research work can investigate the factors that accounted for non-predictability of Institutional Hygiene Readiness among others to guide managers and administrators of higher institution of learning to make informed decisions.

Limitations of the Study

It became clear to us over the course of doing this research that the area of blended learning research is still in its early stages (Graham et al., 2019). There should be a greater emphasis on the creation of models and theories that may be used to guide practice in the future (Graham et al., 2014). Finding blended learning models that were supported by current measurement methodologies proved to be difficult, which was disappointing. In this case, it is possible that only instructors who were comfortable with technology responded to the online questionnaire, which might have resulted in a lack of inclusiveness among the teachers at each school, impairing the study's ability to generalize its findings. Future studies should consider including pen and paper data collection into data collection strategy in addition to online data collection to make it more inclusive. Those who prefer to answer on paper or who have limited computer access will be able to take use of this alternative.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

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