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**Adoption and use of Virtual Learning Environment During the Covid-19 Pandemic:
A perspective of UTAUT3**

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Abstract

After COVID-19, schools have depended heavily on e-learning technologies and resources to adapt to online classrooms. This study validated the UTAUT 3 model at Ghanaian HEIs. SPSS and Smart PLS (Partial Least Square) were used to test our assumptions on 1,874 college students. Eleven of twelve hypotheses were supported; hence most UTAUT-3 components predict students' VLE adoption in HEIs. The model was 70% accurate in predicting students' VLE acceptance in HEIs. The study found that students' use of VLE is motivated by performance expectations (i.e., saving time and effort). This study shows that VLE adoption is largely dependent on the user's beliefs, experience, talents, confidence, personality, and others' opinions. This study is one of the first to combine intrinsic and extrinsic elements and expand the UTAUT-3 model with Website Design in Sub-Saharan Africa.

Keywords: adoption, Ghana, virtual learning education, UTAUT3, structural equation modeling

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INTRODUCTION

The novel covid-19 pandemic which was first discovered by Chinese scientists spread rapidly across many parts of the world (Singh et al., 2021). Many countries around the globe (both developed and developing) were severely affected by the outbreak of the pandemic. A few months during the outbreak of the pandemic, many operational modes changed. Many sectors including education were severely affected (Kalthori et al., 2021; Ayyoubzadeh, 2021; Wilke et al., 2021; Bizri et al., 2021). As a remedy to the situation many organizations resorted to online by investing in emerging technology infrastructures that could keep them in business even amid the pandemic. As a result, there was a significant spike in the need for contemporary technologies (Sepasgoza et al., 2020; Qiao et al., 2021). Arfan Shahzad et al. (2020) indicated that approximately 120 countries around the globe moved from face-to-face learning. UNESCO (2020) also indicated that approximately 1.5 billion students study from home via digital educational platforms. Virtual Learning Environment has emerged as an important tool for teaching and learning especially in tertiary education (Torres et al., 2021; Chitanana, 2022; Shohel et al., 2022). While some educational intuitions started using VLE before covid 19 pandemic, the outbreak of the pandemic turned VLE from being alternative support to face-to-face to becoming an irreplaceable necessity in educational environments whether basic or tertiary. Virtual Learning Education (VLE) has become the protagonist of change and serves as a way to create, store and share knowledge among members of the university community. The idea is to increase access to education, promote independent and lifelong learning, and use alternative education delivery systems that are important to education goals in Ghana. To facilitate the development of human capital in the country and to enhance access to education at all levels, the national education policy has emphasized the development of e-learning in distance learning programs. With the help of information technology and communication, thousands of people from everywhere can receive education through distance learning.

In the light of the growth in demand and usage around the globe, VLE is interferences in Ghana, and the continued usage in the post-pandemic period is challenged. Inadequate user skills, a lack of national policy, misconceptions about the use of technology, infrastructure limits, poor information access, and poor internet connectivity are some of the major obstacles to the success of VLE in Ghanaian HEIs (Asanka et al., 2019; Nanayakkrara and Kusumsin, 2013; Yakubu and Dasuki, 2018).

Also, the rate of online penetration in Ghana from 2000 to 2018 was 34.3% (WIUS, 2018). However, between 2020-2021, the rate has increased to 50% (Digital Ghana, 2021). This provides an interesting opportunity for the implementation of VLE in the Ghanaian educational setting. For the successful implementation of virtual learning technologies, it is important to identify factors that contribute to the acceptance or resistance to new technologies. Meanwhile, there is still scanty literature on VLE adoption and use in developing economies, especially in Sub Sahara Africa.

Though VLE has received significant attention in the post covid era, in reality, its implementation in developing countries like Ghana is limited due to the lack of internet facilities and computers coupled with the high cost of internet in recent times. When presented with new influencers like COVID-19, virtual learning may advance in terms of technology evolution if it's the only means

to educate (Qiao et al., 2021). This study explored COVID-19's function in VLE users' behavior intention and external situations (i.e., Performance Expectancy, Effort Expectancy, Social Influence, Hedonic Motivation, Habit, personal innovativeness and Website Design).

This research responds to calls for a more comprehensive understanding of VLE acceptance and utilization in HEIs where integrated learning is currently voluntary. This study will contribute to the literature on new technology acceptability in higher education. These findings can help HEI authorities and policymakers comprehend VLE's effectiveness. The current study is based on Farooq et al. (2017)'s UTAUT-3, shown in Figure 1. Asanka et al. say the model hasn't been adequately validated (2019). No research has been done in Ghana on applying the UTAUT3 paradigm to VLE usage by students and teachers. Asanka et al. (2019) advised including students and instructors. This study aims to validate UTAUT-3 at Ghanaian HEIs.

THEORETICAL REVIEW AND HYPOTHESES DEVELOPMENT

Farooq et al. (2017) established the UTAUT-3 framework as an enhancement of the UTAUT-2 model, which included eight components for modern technology adoption: PE, EE, social influence (SI), FC, HB, HM, prize value, and personal innovativeness in IT. UTAUT-3 has a 66% explanatory power for predicting IT use, according to its developers. This study uses UTAUT-3 to understand VLE acceptance and utilization for the following reasons: Recent research on academic staff technology adaptation demonstrated lower explanatory power with the use of TAM, IDT, and UTAUT (17-53 percent). UTAUT-3 adds "personal innovativeness in IT" to complement all UTAUT / UTAUT constructs. Understanding how students and employees apply prior education needs IT innovation (Van Raaij and Schepers, 2008). Similar educational technology was tested in Asian countries before UTAUT-3. This project will contribute to IS acceptance theory by testing a novel model in new technology and cultural environment.

Hypothesis Development

Performance Expectancy (PE)

Performance Expectancy (PE) is a consumer's belief in technology to increase job performance. PE shows that students/lecturers believe VLE will help them do their jobs better. PE is a major predictor of technology acceptability, according to studies (Chao, 2019; Rahi et al., 2019; Sobti, 2019; Lee et al., 2019; Chen et al., 2021; Ahmad et al., 2021; Cao et al., 2021; Curtale et al., 2022; Saprikis et al., 2022). Academics may regard the VLE as a valuable and efficient instrument, which influences their decision to use it. Consequently, we expect:

H1: Performance Expectancy (PE) is positively associated with behavioral intention to use a virtual learning environment (VLE).

Effort Expectancy (EE)

EE is the belief that technology use is safe (Venkatesh et al., 2012). Previous studies (Sobti, 2019; Lee et al., 2019; Chen et al., 2021; Ahmad et al., 2021; Cao et al., 2021; Curtale et al., 2022;) have established PE as a predictor of technological acceptability. EE refers to students', lecturers', and administrators' perceptions of the VLE's usability.

H2: Effort Expectancy (EE) is favorably associated with behavioral intention to employ VLE

Social Influence (SI)

SI evaluates a person's belief that their society requires technology (Venkatesh et al., 2012). SI is a driver of technology adoption intention, particularly in the early stages of IS deployment (Venkatesh et al., 2003; Yang et al., 2021; Muangmee et al., 2021; Fischer and Karl, 2022; Zhang et al., 2022; Mindra et al., 2022). (Venkatesh and Davis, 2000). "Social impact" refers to external influences (such as peer pressure or supervisors) that affect VLE attitudes. As a result, it is hypothesized that

H3: Social Influence (SI) is positively associated with the behavioral intention to utilize a VLE.

Hedonic Motivation (HM)

HM, according to Kalini, Marinkovi, Djordjevic, and Liebana-Cabanillas (2019) and Venkatesh, Thong, and Xu (2012) dictate technological adoption and use. Chang, Liu, and Chen (2014) said hedonic motivation is a significant determinant of consumers' intention to interact regularly with emerging technologies such as online games, mobile retailing apps (Iyer et al., 2018), mobile social apps (Hsiao et al., 2016), mobile commerce (Agrebi and Jallais, 2015; Chong, 2013), mobile tourism shopping (Kim et al., 2015), and online food delivery systems (Yeo e (Lai & Shi 2015). Alalwan (2018), Venkatesh et al. (2012), Davis, Bagozzi, and Warshaw (1992), Van der Heijden (2004), and Brown and Venkatesh (2005) asserted that the combination of intrinsic and extrinsic motivation-system quality and information quality is an essential force on consumers' desire and willingness to use modern apps and systems. The foregoing discussion could satisfy academicians who find VLE use intrinsically motivating. Results are inconclusive and unusual in underdeveloped and developed countries. The research reveals that VLE features that help users explore, connect, learn, and earn incentives from peers and students would boost the system's entertainment value. It increases and maintains consumer interest. Academicians may find the VLE system enjoyable and continue using it if satisfied.

H4: Hedonic motivation (HM) is positively related to behavioural intention to use the VLE system.

Habit (HB)

A habit is how a person behaves instinctively or randomly due to past experiences (Venkatesh et al., 2012). HB has the experience, but one encounter isn't enough (Venkatesh et al., 2012). HB commits people to specific actions and prevents them from changing (Murray and Häubl, 2007). HB is supposed to affect customer intention and technology utilization (Tusyanah et al., 2021; Win et al., 2021; Webb et al., 2019). As a result, it's assumed that

H5a: Habit (HB) is linked to behavioral intent to use the VLE system.

H5b: The actual use of the VLE system is favorably connected to habit (HB).

Facilitating Conditions (FC)

FC refers to a consumer's belief in institutional support and services to implement specific technologies (Venkatesh et al., 2012). FC negotiates technical and infrastructure support for system installation. FC affects consumer intent and usage (Venkatesh et al., 2012). (2003).As a result,

H6a: Facilitating Condition (FC) is assumed to be positively connected to behavioral intention to employ the VLE system.

H6b: Facilitating Condition (FC) has a favorable relationship with real VLE system utilization.

Personal innovativeness

Personal innovativeness in IT (PI) is a persistent personality feature that motivates people to try new technologies, according to Farooq et al. (2017). Consumer intention and technology use behavior are influenced by PI. Moreover, several experts have confirmed that personal qualities such as PI have an impact on the use of technology, particularly in the IT area (Dutta et al., 2015; Farooq et al., 2017).

H7a: Personal innovativeness (PI) is thus assumed to be favorably associated with behavioral intention to use the VLE system.

H7b: Personal inventiveness (PI) is related to the practical use of the VLE system in a favourable way.

Website Design (WD)

The terms website design, quality and usability connote the same meaning and they are mostly defined in terms of multiple dimensions. In the view of Zhong & Ying (2008) website design depicts website quality and information quality. Website design, according to Aladwani (2006) and Al-Qeisi (2009), depicts technical quality, general content quality, special content quality, and appearance quality. The dimensions of website design, according to Liu et al (2001), include system quality, information quality, and service quality. This study's website design will be evaluated in five different scenarios. This will have to do with the security and safety of the VLE system, the use of colour and fonts on the VLE system interface, the organization of the internet system web, its availability and regular updates are done on the web of the VLE system.

H8: Website Design (WD) is positively related to behavioral intention to use the VLE system.

Behaviour intention

"Actual use" means "post-adoption behavioural patterns that imitate IS use" (Limayem et al., 2007). Bhattacharjee's (2001) IS continuity model focuses on continuation intention. Bhattacharjee, Perols, and Sanford (2008) extended the paradigm by integrating continuation intention and usage. TAM helps link BI and AU (Quaosar et al., 2018; Eraslan and Kutlu, 2019; Al-Emran et al., 2020; Mensah et al., 2020; Kurdi et al., 2021; Jilani et a., 2022; Curtale et al., 2022). Previous research has examined users' continuation intention, but not as an indicator of HRIM system utilization. The study proposes the following hypothesis to extend the above ties to mobile shopping devices.

H9: Behavioural intention influences intention to use VLE.

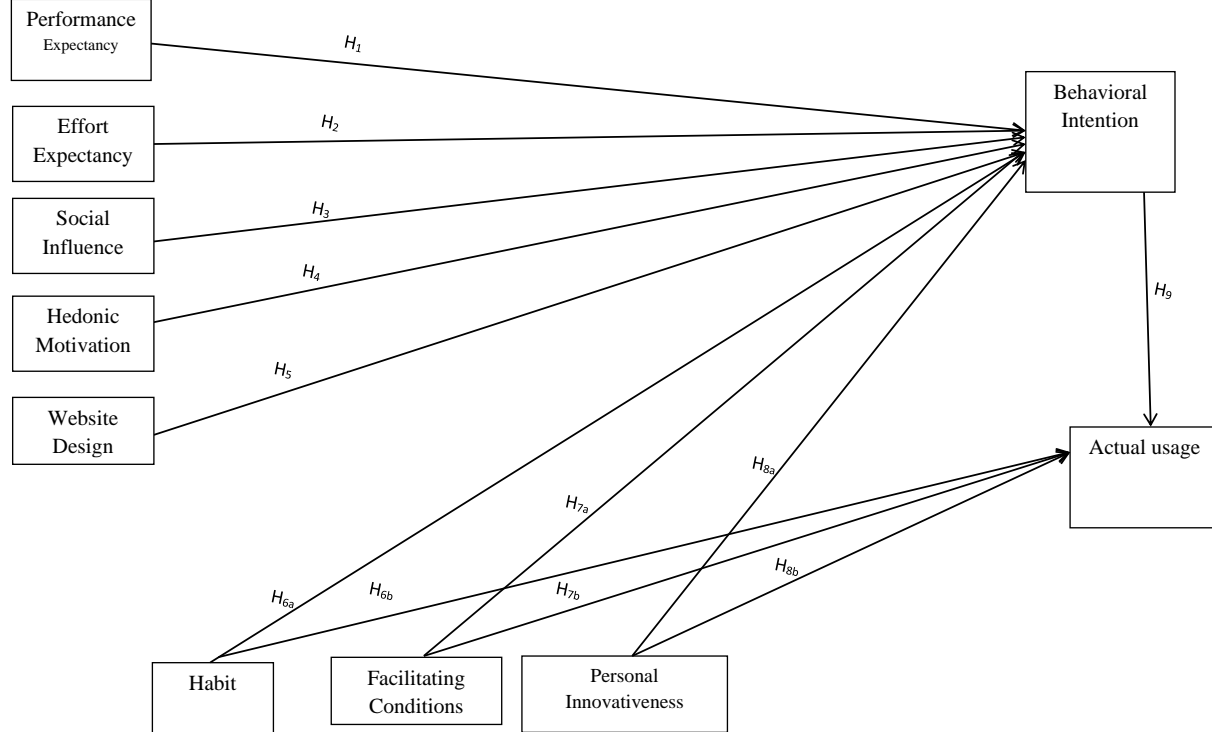


Figure 1: Research Model

METHODOLOGY

Data Collection

A survey approach was used to examine the hypotheses given in an attempt to understand what elements drive the behaviour intention of technology adoption and usage in the academic environment (see Figure 2.1). The survey method was chosen because of its potential to provide reliable documentation of norms, the identification of extreme data, and the characterization of links between components in a study population (Gable, 1994). The survey approach, according to Flynn et al (1990), facilitates research models with real-world data. The survey method allowed data to be collected from 1, 874 Ghanaian university students.

Ten (10) latent variables are present in the research model. All factors were scored on a five-point Likert scale, with one being the most strongly disagreed with and seven being the most strongly agreed with (strongly agree). To measure each construct in the model, a thorough literature review was undertaken to find acceptable validated items with their psychometric features. Three academic information systems professionals assisted in the pre-testing of the instrument. The officers' feedback was used to tailor the tool to the Ghanaian higher education context. Even though the measuring items were adapted from previous research, the researchers believe it is critical to do a pre-test to ensure that the questions are appropriate for the respondents (Kumar et al., 2013). The questionnaire was given to 56 students and lecturers who agreed to take part in the pilot project. The goal of the pre-test and pilot study is to reword, delete, and/or add new elements as needed to improve respondent comprehension of the questions (Hair et al., 2012).

The primary data was collected through a self-administered questionnaire that was distributed utilizing the Kobo toolbox on WhatsApp platforms.

Data Analysis

Statistical methods were used to analyse the data. Structural equation modeling (SEM) was chosen as the study's main analysis method since it solves important research issues (Hair et al, 2017b; Wong, 2013; Wong, 2019). SEM examines the relationship between independent and dependent variables, unlike multiple regression and correlation analysis (Wong, 2013; Wong, 2019). The SEM tests a structural theory that affects phenomena using a confirmatory procedure. This technique was used because it can manage several independent and dependent variables at once. According to Hair et al., SEM allows for latent variables, measurement errors, and evaluation of diverse and related relationships among variables (2013). The build's dependability was evaluated using composite and internal reliability (Cronbach Alpha). Cronbach Alpha scores are all above 0.7. In this work, SEM started with item loading and average variance (AVE). Convergent validity was assessed using outer loadings and AVE (Table 2). All item loadings and AVE values are above 0.7. Hair et al., 2013) Each latent variable's diagonal (square root of AVE) is bigger than its maximum correlation (Appendix 1). (Dwaikat, 2018). This study disproves multicollinearity (Bryne, 2001). Multicollinearity was checked using VIF and tolerance levels. VIF and tolerance values less than 10 and >0.2 are acceptable (Pallant, 2005). The inquiry tested the hypothesized model. The analysis is below.

RESULTS

This study's data analysis is split into two parts. The model measurement was done by confirmatory factor analysis in the first phase (CFA). The hypotheses were tested using a structural equation model in the second phase (SEM). The Partial Least Squares-Structural Equation Modeling method was used in both phases of the analysis (PLS-SEM). The flexibility of PLS-SEM in terms of sample distributional characteristics and sample size influenced the choice in this study; however, the choice was justified by the data's inability to meet all of the multivariate assumptions (i.e. normality) required in parametric analyses (Hair et al., 2017).

Test of Survey Bias

Although the study was carried out at the height of the covid, it adhered to the protocol and ethics of research by first obtaining respondents' consent and then assuring respondents repeatedly that any information they provide would not be used for any purpose other than that for which consent had been sought. Definitions of the study's many constructs were built into the questionnaire's structure. The high response rate (62%) and the confirmed reliability and validity were both aided by the rigor of this study's methodology. Since survey-based research is inherently biased, we used the method for assessing non-response bias proposed by Armstrong and Overton (1977). No statistically significant differences were found between early and late respondents using the t-test in this investigation (see Appendix I). This study only had one responder, but we nevertheless utilized Harman's single factor technique to look into the possibility of common method bias, and we found that no single factor accounted for more than 50% of the total variance.

Descriptive and Correlation Analyses

Behavioural Intention was also measured (Mean = 4.165; SD=0.762) in Table 4.1. Expectancy of performance (Mean = 3.98; SD=0.975) was estimated. Calculated using an expected effort scale (Mean = 3.818, SD = 0.968). (Mean = 3.910; SD=1.104) Website Design achieved a score of (Mean = 3.910; SD=1.104). Hedonic Motivation (Mean = 3.740; SD=1.069) was assessed. Scores for Facilitating Conditions (Mean = 4.093; SD=1.195) Stakeholder support was rated (Mean = 3.967; SD=0.891), IT support was rated (Mean = 4.363; SD=0.730), and actual VLE system utilization was scored (Mean =2.903; SD=1.110). Performance Expectancy (PE), Effort Expectancy (EE), Website Design, Hedonic Motivation (HM), and Facilitating Conditions all scored above 3.50 in the descriptive analysis, demonstrating that these qualities are essential in understanding VLE uptake in higher education institutions (HEIs) (HEIs). Personal Innovativeness (PI) and Social Influence (SI) both scored above 3.50, indicating that they are major variables in enhancing VLE adoption. Surprisingly, genuine VLE system usage was found to be fairly low, with a score of (Mean=2.903). Table 1 shows a positive and significant relationship between Performance Expectancy (PE), Effort Expectancy (EE), Website Design, Hedonic Motivation (HM), Facilitating Conditions, and Behavioural Intention (BI) to adopt VLE systems in Higher Educational Institutions ($r=.533, P<.05; r=.509, P<.05; r=.473, P<.05; r=.582, P<.05; r=.439, P<.05; r=.472, P<.05$ and $r=.592, P<.05$). As a result, higher levels of Performance Expectancy (PE), Effort Expectancy (EE), Website Design, Hedonic Motivation (HM), and Facilitating Conditions are associated with higher levels of Behavioural Intention (BI) to utilize the VLE system. However, there was a positive relationship between Performance Expectancy (PE), Effort Expectancy (EE), Website Design, Hedonic Motivation (HM), Facilitating Conditions, and Actual Usage of the VLE system ($r=.502, P<.05; r=.563, P<.05; r=.512, P<.05; r=.565, P<.05; r=.524, P<.05; r=.512, P<.05$ and $r=.564, P<.05$). Thus, in Ghana, higher levels of Performance Expectancy (PE), Effort Expectancy (EE), Website Design, Hedonic Motivation (HM), and Facilitating Conditions are substantially connected to increasing VLE uptake.

Table 1 Descriptive Statistics and Correlation Analysis

Variables	Mean	std	1	2	3	4	5	6	7	8	9
1. BI	4.165	0.762	1								
2. PE	3.980	0.975	.533**	1							
3. EE	3.818	0.968	.509**	.701**	1						
4. WD	3.910	1.104	.473**	.435**	.552**	1					
5. HM	3.740	1.069	.582**	.431**	.595**	.665**	1				
6. FC	4.093	1.195	.439**	.271**	.358**	.409**	.523**	1			
7. PI	3.967	0.891	.472**	.345**	.327**	.247**	.279**	.217**	1		
8. SI	4.363	0.730	.592**	.531**	.298**	.289**	.357**	.345**	.459**	1	
9. AU	2.903	1.110	.502**	.563**	.512**	.565**	.524**	.536*	.512**	.564**	1

Measurement Model Assessment

During the first stage of the investigation, which focused on the assessment of the model, CFA was used to evaluate the internal consistency of all of the components. Internal consistency was evaluated with the help of CA. To my surprise, every single CA level was well above the

maximum safe threshold (0.7). What this means is that the model's structures may be relied upon. Discriminant and convergent validity were also assessed using the Fornell-Larcker criterion. Results showed that indicator loadings varied from 0.702 to 0.995. The final loading for the constructs was calculated, and it came out to be 0.81 after removing the items that did not meet the 0.7 requirements. More importantly, the composite dependability coefficient suggested that the scale could be trusted (CR values above 0.7). The results showed that every single AVE value was more than the threshold of 0.5. Convergent validity is thus demonstrated. Furthermore, discriminant validity was established by comparing the square roots of the constructs to their within (bivariate) correlations, and the results showed that in both cases, the square roots of the constructs were bigger than they are within correlations.

Table 2: Quality Criteria and Factor Loadings

Constructs	Items	Loadings	CA	rho_A	CR	AVE	VIF
Use Behavior	AU1	0.855	0.868	0.874	0.909	0.715	2.154
	AU2	0.868					2.234
	AU3	0.853					2.178
	AU4	0.805					1.880
Behavioral Intentions	BI1	0.933	0.935	0.935	0.958	0.885	1.616
	BI2	0.944					2.242
	BI3	0.946					1.268
Effort Expectancy	EE1	0.910	0.808	0.810	0.912	0.839	1.848
	EE2	0.921					1.848
	FC1	0.791					1.703
Facilitating Conditions	FC2	0.858	0.848	0.853	0.898	0.688	2.107
	FC3	0.864					2.240
	FC4	0.802					1.754
	HM1	0.923					0.930
HM2	0.942	1.082					
HM3	0.944	1.223					
Habit	HT1	0.876	0.902	0.903	0.931	0.773	2.650
	HT2	0.876					2.654
	HT3	0.860					2.326
	HT4	0.904					1.030
	PE1	0.890					0.915
PE2	0.909	1.417					
PE3	0.873	2.568					
PE4	0.899	1.081					
Personal Innovativeness	PI1	0.900	0.881	0.883	0.926	0.807	2.449
	PI2	0.889					2.395
	PI3	0.906					2.499
Social Influence	SI1	0.916					2.921

	SI2	0.911	0.914	0.915	0.946	0.853	2.079
	SI3	0.943					1.174
Website Design	WD1	0.874	0.737	0.745	0.883	0.791	1.516
	WD3	0.904					1.516

Table 3: Discriminant Validity

Constructs	1	2	3	4	5	6	7	8	9	10
1. Behavioral Intentions	0.94									
2. Effort Expectancy	0.65	0.916								
3. Facilitating Conditions	0.66	0.748	0.829							
4. Habit	0.75	0.627	0.679	0.879						
5. Hedonic Motivation	0.72	0.685	0.679	0.734	0.93					
6. Performance Expectancy	0.70	0.704	0.653	0.706	0.72	0.893				
7. Personal Innovativeness	0.70	0.679	0.738	0.711	0.69	0.692	0.89			
8. Social Influence	0.62	0.554	0.594	0.623	0.60	0.643	0.56	0.92		
9. Use Behavior	0.78	0.643	0.682	0.762	0.71	0.714	0.73	0.59	0.84	
10. Website Design	0.64	0.589	0.645	0.613	0.62	0.614	0.67	0.52	0.68	0.88

Table 5: Heterotrait-Monotrait Ratio (HTMT)

Constructs	1	2	3	4	5	6	7	8	9	10
Behavioral Intentions										
Effort Expectancy	0.754									
Facilitating Conditions	0.744	0.703								
Habit	0.821	0.732	0.775							
Hedonic Motivation	0.781	0.790	0.765	0.801						
Performance Expectancy	0.760	0.817	0.742	0.776	0.787					

Personal Innovativeness	0.778	0.803	0.751	0.795	0.768	0.769			
Social Influence	0.673	0.642	0.675	0.684	0.653	0.703	0.624		
Use Behavior	0.666	0.761	0.786	0.658	0.785	0.797	0.830	0.659	
Website Design	0.777	0.763	0.813	0.748	0.750	0.745	0.839	0.630	0.652

Structural Model and Hypotheses Testing

Results from analysing the structural model are presented in Table 5 and Figure 2. PLS bootstrapping with 5,000 samples were used to examine the importance of the model's nine (9) pathways. Before hypothesis testing, multicollinearity was evaluated using VIF, and the results showed that the VIF values obtained in this study were lower than the 3.3 level recommended by the authors (Kock, 2015). There is thus evidence that the predictors are unaffected by multicollinearity. Following the recommendations of Henseler and Ray, we also looked into a model fit (2016). The SRMR was approximately .712, far lower than the 0.8 cutoff value established by the data. Because of this, it may be concluded that the proposed model is a good fit for the data.

As can be seen in Figure 2, the results indicate that the model explains 69 percent of the variance in tertiary students' behavioural intentions and 71.3 percent of the variance in their use of virtual learning environments. Statistically significant effects of H1, H2, H3, H4, H5a, H6a, H7a, and H8 were found on behavioural intention to adopt VLE among tertiary students, with $p < 0.05$, for Effort Expectancy, Performance Expectancy, Facilitating Conditions, Habit, Social Influence, Hedonic Motivation, Personal Innovativeness and Website Design. Verification of hypotheses H5b, H9, and H7b that habit, personal innovativeness, and behavioural intentions all have a statistically significant effect on actual VLE usage among tertiary students was achieved at the $p < 0.05$ level. The results of the study, however, disproved H6b and H6c, showing that Facilitating Conditions did not affect actual VLE usage among tertiary students (all $p > 0.05$).

Table 6: Direct Relationships

Hypotheses	Path Coefficient	StD	T Statistics	P Values	Results
H1: Performance Expectancy -> Behavioral Intentions	0.095	0.037	2.481	0.013	Supported
H2: Effort Expectancy -> Behavioral Intentions	0.075	0.035	2.241	0.025	Supported
H3: Social Influence -> Behavioral Intentions	0.104	0.029	3.660	0.000	Supported
H4: Hedonic Motivation -> Behavioral Intentions	0.171	0.036	4.728	0.000	Supported
H5a: Habit -> Behavioral Intentions	0.285	0.033	8.681	0.000	Supported
H5b: Habit -> Use Behavior	0.270	0.033	8.155	0.000	Supported
H6a: Facilitating Conditions -> Behavioral Intentions	0.005	0.033	0.075	0.940	Not Supported
H6b: Facilitating Conditions -> Use Behavior	0.107	0.026	4.227	0.000	Supported

H7a: Personal Innovativeness -> Behavioral Intentions	0.126	0.036	3.528	0.000	Supported
H7b: Personal Innovativeness -> Use Behavior	0.197	0.031	6.325	0.000	Supported
H8: Website Design -> Behavioral Intentions	0.121	0.031	3.914	0.000	Supported
H9: Behavioral Intentions -> Use Behavior	0.371	0.035	10.426	0.000	Supported

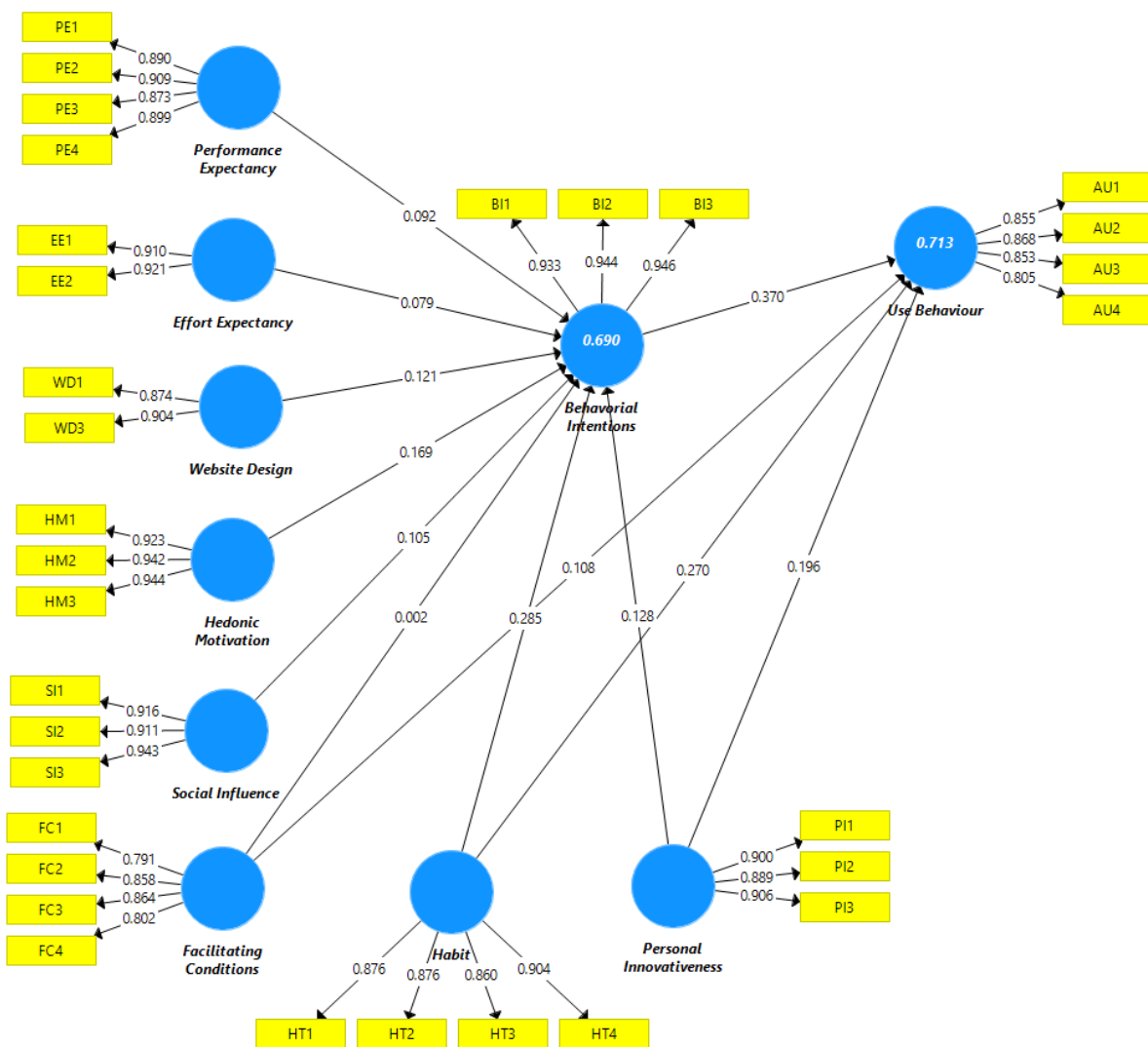


Figure 2; Measurement Model for VLE Adoption and Use Behaviour in HEIs

DISCUSSION OF FINDINGS

This study sought to contribute to the development and validation of the UTAUT-3 model created by Farooq et al. (2017) by analysing the acceptance of VLEs among tertiary students in higher international institutions. However, many HEIs were compelled to adopt VLE due to the spread

of the covid-19 pandemic, despite the fact that their use was already technologically skewed. Eleven of the twelve hypotheses tested in the study were confirmed, indicating that most of the UTUAT-3 components are significant predictors of students' VLE adoption in HEIs. Overall, the model proved quite useful for predicting whether or not students will use VLE in HEIs (70 percent). According to the findings, students are driven to use virtual learning environments by the expectation of improved performance. This finding lends credence to previous claims made by proponents of the relevance of PE in understanding academics' adoption of BI (Bervell and Umar, 2017; Lopez-Perez et al., 2019). VLEs can help students with tasks including quizzes, assignments, exams, signing up for semester courses, seeing results, and rating instructors in a university setting. If students believe that using a VLE will help them do better academically, they are more likely to make use of such a tool. Again, it was discovered that EE has a big impact on a student's desire to use a virtual learning environment. This result agrees with other studies, including (Afad, 2018; Bervell and Umar, 2017; Lopez-Perez et al, 2019; Maican et al,2019). This indicates that students who perceive the VLE to be simple to use are more likely to adopt and use the technology. As a result, authorities must continue to give the training to make it easier for students to use VLE. Similarly, FC was found to significantly affect both students' intent to use VLE and their actual use of VLE. The mandate does not care about previous research (Dwivedi et al, 2017; Raman and Don, 2013; Farooq et al, 2017; Lopez-Perez et al, 2019). A prior study by Gamage and Fernando ,2016) revealed that all HEIs are directed towards facilities technology centered on learning. Therefore, students have access to computer labs and electronic libraries on campus to use VLE. The results show that students are more likely to accept and use VLE at HEIs that have the necessary technological resources. Because of this, administration at tertiary institutions must provide access to VLE resources and essential infrastructure (such as PCs, WIFI, or internet services). Significant effects of HB, HM, and WD on BI were also seen; these results corroborate those of earlier investigations (EL-Masri and Tarhini , 2017; Kari et al, 2015; Nair et al, 2015). Further analysis revealed a correlation between BI and VLE adoption. This suggests that the degree to which students in HEIS want to adopt VLE predicts their actual use of VLE. It is also supported by (Shen and Sharriff, 2016; Skoumpopoulou et al, 2018; Sumak and Sorfo,2016). The study's findings also backed the hypothesis that students' perceptions of the value of the learning environment (SI) play a major role in shaping their VLE adoption intentions. This finding runs counter to the conclusions drawn from research by Gunasinghe et al. (2019), Khechine and Lakhal. (2018), and Wrycza et al. (2017), all concluded that peer pressure plays no significant impact in the adoption of new technologies. In line with the UTAUT-3 results, PI in information technology significantly affects both initiation and actual usage of VLE in HEIs, indicating its relevance in understanding students' VLE adoption. The findings also run counter to those of Lu et al. (2005), who found that Personal Innovativeness does not affect Behavioral Intentions, a finding that was later corroborated by other authors (Lopez-Perez et al./ 2019; Puram et al., 2019; Yary et al., 2012; Rosen 2005; Fieldler and Park, 2006; Akari,2019). Consequently, students' adoption of VLE may be motivated by curiosity, lending credence to Gunasinghe et al(2018) .'s finding that PI plays a crucial role in predicting lecturers' acceptance of VLEs.

Managerial and Practical Implications

Findings from this study contribute to the refinement and confirmation of current IS ideas. This study adds credence to the UTAUT-3 model of VLE uptake in HEIs in developing countries like Ghana. The researchers used empirical data from students in HEIs to validate the recommended research model by extending the UTAUT-3 model with Website Design. Therefore, to comprehend how students feel about using VLEs, the research integrated technological and social psychological elements. A high coefficient of determination for the integrated model suggests that the proposed model is correct. Users' prior knowledge, attitudes, abilities, self-perceptions, and social support all have a role in whether or not they adopt a VLE, as demonstrated by the results of this study. Despite this, the study verified the UTAUT-3 framework by investigating the factors that significantly impacted VLE adoption in Ghana's HEIs: effort expectation, performance expectation, facilitating conditions, habit, social influence, hedonic motivation, and personal inventiveness. The study is the first to add WE into the UTAUT-3 model, and it was found to be valid. This study contributes to the theory of IS adoption and the body of knowledge about VLE adoption in HEIs as a result of the covid-19 pandemic, which compelled many educational institutions to deploy VLEs. In the push to establish and execute VLEs, the study delivers vital knowledge to HEI administration and policymakers. Following the breakout of the covid-19 pandemic, in which students were compelled to cease all academic activities, it is vital to stress that successful deployment of VLEs would assist HEIs in overcoming some of the drawbacks of the traditional classroom setting. The results of this study provide credence to the theory that creative thinkers are more likely to be early adopters of technological advances (Rogers, 1983). Based on the findings of this study, HEIs in the process of introducing VLEs must identify such potential users to allow them to experiment with the system and maybe make a judgment, as well as make such people leaders who can persuade and support others to utilize the VLE system. In this setting, VLEs may spread more quickly as institutions of higher education actively encourage their adoption by their students. Again, HEI administrations must provide help and facilities, as well as training, a user-friendly VLE interface to make use easier, frequent information on VLE usage, and incentives to encourage high VLE usage among HEI students.

To better meet the needs of its users, virtual learning environments (VLEs) should have a more flexible web design. In addition, the IT team, along with upper management, the user departments, and the software developer, should get together regularly to discuss methods to better the user interface and design modules to guarantee they are continually meeting the needs of the users. Based on the findings, the IT department must ensure that the VLE system is routinely monitored to ensure maximum delivery and high-level accuracy for students to fully make use of the system's instructional support tools in terms of frequency, nature, and duration of use. This will ensure that the VLE System in Ghana's HEIs is being used to its full potential.

Students' intentions to embrace VLE in HEIs in Ghana can be predicted with a high degree of accuracy by their levels of PE, EE, HB, HM, SI, WD, and PI. These criteria are shown to be a significant predictor of VLE adoption. Together, these elements serve as predictors of future VLE adoption and use. Maximizing VLE usage relies heavily on knowing what motivates users to access IS. Policymakers should therefore learn about and account for these considerations in the design and rollout of VLE systems to increase their use in tertiary institutions.

Theory's Potential Consequences

This work theoretically expands the current IS and UTAUT-3 paradigm by discovering a new antecedent of IS usage. To better understand why people want to embrace VLE, we incorporated both extrinsic and hedonic factors into this study. Specifically, it suggests extending the UTAUT-3 model and the IS Success model with Website Design to provide a more complete explanation of user behaviour before adoption. To better understand the factors that drive VLE use, especially in Sub-Saharan Africa, this study is groundbreaking since it is one of the first to extend the UTAUT-3 model to incorporate website design. This all-encompassing approach creates greater value by enhancing the model's prognostic capabilities and deepening our understanding of how Website Design impacts deployment. The study seems to indicate that the quality of the website's design is a robust predictor of future IS adoption in the educational sector.

Theoretical Implications

Finding a novel antecedent of IS usage, this work theoretically extends the existing IS and UTAUT-3 paradigm. In this research, we combined extrinsic and hedonic elements to explain people's intent to adopt VLE. To better explain user behaviour before adoption, it proposes an expansion of the UTAUT-3 model and the IS Success model with Website Design. This research is pioneering since it is one of the first to extend the UTAUT-3 model to include website design to better understand the elements that influence VLE use, particularly in Sub-Saharan Africa. By improving the model's ability to foresee future outcomes and by expanding our knowledge of how Website Design affects IS deployment, this holistic strategy generates more value. Specifically for the educational setting, the study seems to show that the quality of the website's design is a strong predictor of future IS adoption.

CONCLUSION

Virtual learning environments (VLEs) are increasingly being seen as an effective method for providing distance education and decreasing campus population sizes. The purpose of this research was to experimentally analyse the UTAUT 3 model's appropriateness in Ghanaian higher education institutions. There was a total of 1,874 participants from various universities in Ghana. Respondent information was gathered via a structured questionnaire administered via the Kobo Collect platform. With the help of SPSS and Smart PLS, we studied the data to see if our predictions held up (Partial Least Square). The results of the study showed that students are more likely to use VLE if they believe it will increase their performance (i.e., save them time and effort). Users' prior knowledge, attitudes, abilities, self-perceptions, and social support all have a role in whether or not they adopt a VLE, as demonstrated by the results of this study. Combining internal and external factors and extending the UTAUT-3 model to incorporate website design, this study is among the first to examine VLE use in Sub-Saharan Africa. This integrated approach adds value to the model by enhancing its predictive relevance and provides a more in-depth knowledge of the impact of website design on IS utilization.

RECOMMENDATION FOR FUTURE RESEARCH

Further research should be conducted to explore the function of management in managing the change process of implementing a VLE System. This may have an impact on the VLE System's continued use. To see if the variables indicated in this study are consistent, the research could be

expanded to include lectures and administrators. The model might theoretically be expanded to add institutional cultural and demographic elements to see how these affect VLE utilization.

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Appendices

Table 1 Results of Independent-Samples t-Test for Non-Response Bias

Variables	Group	Mean	Std. Deviation	Levene's Test for Equality of Variances		
				F	Sig.	t
PE	1.00	15.6476	3.35458	1.904	.016	-.721
	2.00	15.8714	2.99244			
EE	1.00	15.0810	3.13311	.176	.675	-.755
	2.00	15.3095	3.06928			
WD	1.00	19.6143	3.44037	.765	.382	1.096
	2.00	19.2048	4.18027			
PI	1.00	15.1238	3.42575	.230	.632	0.096
	2.00	14.4190	3.46626			
HM	1.00	16.1524	2.72251	0.792	.403	1.628
	2.00	15.3857	3.23391			
FC	1.00	16.4048	3.66190	.029	.865	1.139
	2.00	16.0476	2.68927			
BI	1.00	16.7238	2.35384	1.233	.267	1.490
	2.00	16.3429	2.86149			
AU	1.00	11.3810	2.48779	1.047	.307	-1.294
	2.00	11.6905	2.41296			
HT	1.00	16.9952	2.14431	1.944	.164	.109
	2.00	16.9571	4.60113			
SI	1.00	17.6000	2.16585	1.160	.142	1.364
	2.00	17.0095	2.90024			

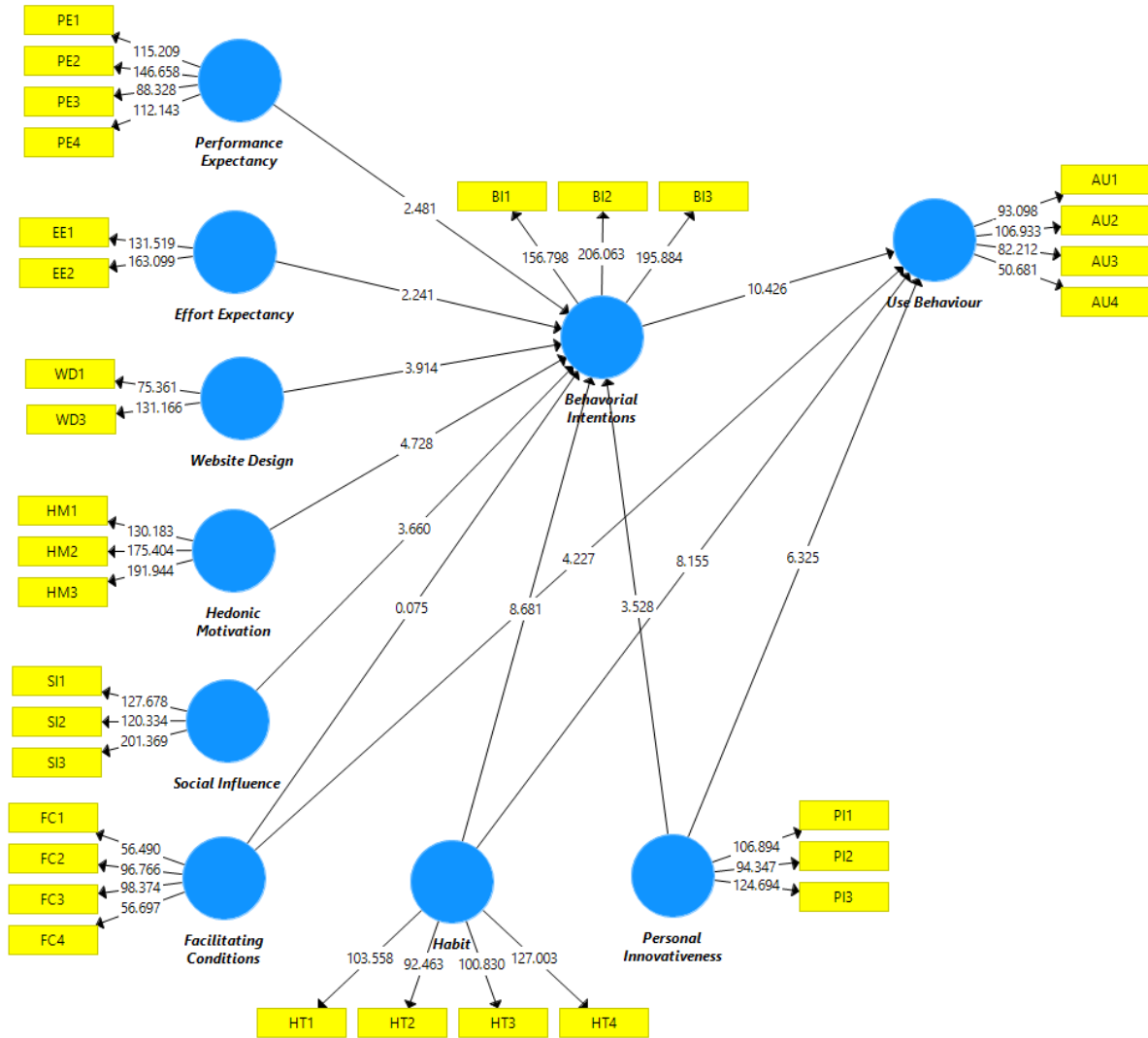


Figure 3 ; Structural Model for VLE Adoption and Use Behaviour in HEIs