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Exploratory analysis of online learning readiness of graduate students using a modified unified theory of acceptance and use of technology model

Sunday Abidemi Itasanmi[1] ✉
Oluwatoyin Ayodele Ajani[2]
Godwin Beshibeshebe Ushie[3]
Sunday Samson Babalola[4]


(✉ Corresponding Author)

[1]*Department of Adult Education, University of Ibadan, Nigeria.*
Email: itasunny2000@gmail.com
[2]*Languages and Social Sciences Education, University of Zululand, KwaDalangezwa, South Africa.*
Email: oaajani@gmail.com
[3]*Department of Continuing Education and Development Studies, University of Calabar, Nigeria.*
Email: ushie@unical.edu.ng
[4]*Department of Human Resource Management, Walter Sisulu University, Butterworth, 4960, South Africa.*
Email: sbabalola@wsu.ac.za

Abstract

This study presents a framework for understanding the factors influencing graduate students' online learning readiness using a modified Unified Theory of Acceptance and Use of Technology (UTAUT) model. A quantitative research method was adopted with data collected from 3,120 graduate students at the University of Ibadan. Structural Equation Modelling (SEM) was used to analyse the relationships among five constructs: technology self-efficacy, digital literacy, performance expectancy, and facilitating conditions. Age, gender and marital status were examined as moderators. Digital literacy emerged as the most significant factor influencing online learning readiness. Gender positively moderated the relationship between digital literacy and readiness as well as between performance expectancy and readiness. Age and marital status did not show significant moderating effects. The study confirms the critical role of digital literacy in preparing graduate students for online learning with gender further influencing this readiness. Institutions and policymakers should prioritize enhancing digital literacy and providing targeted support to foster inclusive online learning environments. Addressing these factors can improve students' transition and success in digital education platforms.

Keywords: Digital literacy, Facilitating conditions, Graduate students, Modified UTAUT model, Nigeria, Online learning readiness, Performance expectancy, Technology self-efficacy.

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Contents

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Contribution of this paper to the literature
This study modifies and validates the Unified Theory of Acceptance and Use of Technology (UTAUT) framework in a developing country context. The study highlights digital literacy as the most influential factor in online learning readiness, providing empirical evidence that extends beyond traditional UTAUT constructs such as performance expectancy and facilitating conditions.

1. Introduction

Globally, the landscape of higher education has witnessed a significant paradigm shift from a traditional instructional model to a more flexible and dynamic digital learning process. This shift has been made possible by the increasing use of online learning platforms. Centuries ago, the traditional instructional system was the cornerstone of academic learning and it was characterized by a physical sphere of learning in which students and teachers interacted, exchanged knowledge, and experienced the world around them. However, online learning has emerged as a prominent mode of instruction, expanding education beyond traditional classroom confines with continuous advancements in technology, changing demographics of students, the need for flexible learning options, and, more recently, the onset of the COVID-19 pandemic (Rasiah, Kaur, & Guptan, 2020). Online learning refers to a form of learning synchronously or asynchronously delivered or accessed through the Internet (Itasanmi, Ekpenyong, Akintolu, & Ajani, 2022). According to Dhawan (2020), online learning serves as a tool that shifts the teaching-learning dynamic from being centred around the teacher to the student, fostering innovation and flexibility within the learning process. Online learning provides a viable and exciting approach to instructional delivery to students based on the flexibility of time and location. The importance of online learning in massifying education in this contemporary time cannot be emphasised. Online learning has democratized education, enabling individuals from diverse backgrounds worldwide to access high-quality educational materials either freely or at minimal costs (Acebo, 2023). Thus, many educational barriers, including geographical location, socioeconomic status, and physical disabilities have impeded access to education (London Boulevard Business College, 2023).

Higher institutions worldwide, including universities in developing countries have recognised the potential of online learning because of its ubiquitous accessibility and flexibility and have embraced it to expand their reach and impact (Hung, Chou, Chen, & Own, 2010). Many universities in the African continent have integrated online education into their offerings and have developed robust online learning platforms and programmes that offer a wide range of courses and degrees that cater to the human capacity development needs of their respective countries and the interests of a global audience (Itasanmi, Ajani, Andong, & Omokhabi, 2024). In the realm of graduate education and training where students seek to advance their careers while balancing work and personal commitments, online learning provides the flexibility to tailor their educational experiences to fit their schedules, thereby enabling them to balance work, family and other commitments (London Boulevard Business College, 2023). However, the success of online learning is underpinned by a confluence of factors ranging from institutional factors, such as technological infrastructure, faculty support, course design, quality assurance, and support services, to student factors, including self-motivation, digital literacy, time management skills, adaptability, resilience, and online learning readiness to engage and adapt to this mode of instruction (Joosten & Cusatis, 2020). Kirmizi (2015) and Bovermann, Weidlich, and Bastiaens (2018) established that learners' readiness for online learning significantly impacts the efficacy of online learning platforms. Readiness can improve learner satisfaction and foster student motivation to use such systems (Lau & Shaikh, 2012).

The term "online learning readiness" was initially introduced by Warner, Christie, and Choy (1998). It has been used to refer to a spectrum of attributes and skills that enable learners to engage effectively in the online educational environment (Bharathy & Gayathiri, 2023). According to Liu and Kaye (2016), online learning readiness encompasses students' mental and physical preparedness, technical skills, knowledge capabilities, and motivation to participate in online learning. Searle and Waugh (2013) asserted that students' readiness for online learning has been influenced by technological proficiency, self-regulated learning skills, and attitudes towards online learning platforms. However, concerns are gradually increasing about students expressing lower satisfaction with online learning than traditional methods. This has potentially affected attrition rates in online learning, which are estimated to be twice as high as in traditional courses (Lau & Shaikh, 2012). Thus, it amounts to a waste of effort, time, and resources by students and the university. According to Searle and Waugh (2013), the rapid growth of online learning and the continuous increase in the attrition rate of online programmes over the past decade have necessitated researchers to stress the importance of understanding student readiness for online learning. Therefore, understanding the factors that influence students' readiness for online learning is crucial for teachers and institutions to design effective learning experiences and support mechanisms tailored to the needs of diverse student populations for online success.

Several previous studies by Carvalho and Cunha (2020), Chung, Subramaniam, and Dass (2020), Dehghan, Esmaeili, Paridokht, Javadzade, and Jalali (2022), Doe, Castillo, and Musyoka (2017), Engin (2017), Ibrahim, AL-Sinawi, Yanju, and Musah (2022), Luu (2022), Vehapi and Bajrami (2023) and Wulanjani and Indriani (2021) have assessed the online learning readiness of students in various contexts worldwide. Only limited studies by Bharathy and Gayathiri (2023), Herguner, Son, Herguner Son, and Donmez (2020), Pham and Dau (2022) and Wagiran, Suharjana, Nurtanto, and Mutohhari (2022) have sought to establish factors that influence students' online learning readiness. Most studies have predominantly focused on undergraduate students; none have been conducted specifically among graduate students. However, graduate students have unique learning requirements in an online environment compared to undergraduate students. They need deeper engagement with content, opportunities for research, and interactions with peers and faculty which can be more challenging to replicate online (Gillett-Swan, 2017). There exists a research gap concerning the nuanced impact of technology self-efficacy, digital literacy, performance expectancy, and facilitating conditions on predicting graduate students' readiness for online learning. Therefore, an empirical study of this kind is necessary to lay the groundwork for future comprehensive research to investigate further and validate the factors influencing online learning readiness among graduate students. Hence, this study investigated the factors influencing graduate students' online learning readiness. This study contributes to the existing knowledge on online learning readiness and provides valuable insights for educational institutions and policymakers on strategies to enhance their online learning offerings to graduate students.

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The Unified Theory of Acceptance and Use of Technology (UTAUT) model introduced by Venkatesh, Morris, Davis, and Davis (2003) has been an outstanding model globally. UTUAT has been utilised by researchers to explore individuals' acceptance and adoption of technology across diverse contexts. UTUAT constructs have also been modified and extended to investigate technology adoption across several domains. For instance, Tey and Moses (2018) and Mailizar, Burg, and Maulina (2021) extended the UTUAT model. Zuiderwijk, Janssen, and Dwivedi (2015) and Kurniawan, Rahayu, Wibowo, and Hendrayati (2021) modified it to align with the specific context of their research. Thus, the present study modifies the UTUAT model to propose an enhanced model capable of explaining online learning readiness because the applicability of the original UTAUT model to the domain of online learning readiness among graduate students may require modification. This is based on the unique challenges and motivations within this demographic. The literature also indicates that specific demographic factors, particularly age and gender play a significant role as moderators in technology adoption models. This study examined the moderating effects of age, gender, and marital status on the relationships within the modified UTAUT model.

This study explored the factors influencing graduate students' readiness for online learning. This study focused on investigating factors, such as technology self-efficacy, digital literacy, performance expectancy, and facilitating conditions that influence the online learning readiness of graduate students. This was done to understand the factors critical to graduate student's success in the online learning environment. The study also prompts a better understanding of the skills and resources necessary for graduate students to navigate online learning platforms and how institutions and policymakers could foster a supportive and inclusive learning environment to enhance graduate students' readiness for online learning. Moreover, this study adds to the discussion on applying the UTUAT model in the context of technology acceptance, particularly concerning online learning readiness.

2. Theoretical Framework: Theory of Acceptance and Use of the Technology Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) was introduced by Venkatesh et al. (2003) as an integrative framework that combines eight prominent theories of technology adoption. These include the theory of reasoned action, the technology acceptance model (TAM), the theory of planned behavior, the diffusion of innovations theory, the social cognitive theory, the motivational model, the model of PC utilization and a hybrid of TAM and the theory of planned behavior (Dwivedi, Rana, Tamilmani, & Raman, 2020). UTAUT provides a more comprehensive explanation of user intentions and behaviours related to information technology adoption by consolidating these theories (Alharbi & Drew, 2014). The UTAUT model identifies four key determinants that influence an individual's behavioural intention and actual usage of technology. These include

1. Performance Expectancy. This refers to the extent to which an individual believes that using a particular technology will enhance his or her ability to perform tasks effectively.
2. Effort Expectancy: This connotes the ease associated with using a particular technology. The more a technology is perceived to be simple and user-friendly, the greater the likelihood of using it.
3. Social Influence: This refers to the degree to which an individual perceives the influence of the significance of others (friends, peers, and family) in adopting the new technology.
4. Facilitating Conditions: This refers to the availability of resources, support, and infrastructure that could enhance the adoption and use of new technology (Venkatesh et al., 2003).

Additionally, the UTAUT model incorporates moderating factors, such as gender, age, experience, and voluntariness of use that influences the relationships among UTUAT constructs. According to Venkatesh et al. (2003), age moderates the effect of all four UTAUT constructs while gender moderates the relationships between effort expectancy, performance expectancy, and social influence. Furthermore, experience moderates the associations between effort expectancy, social influence, and facilitating conditions whereas voluntariness of use moderates the relationship between social influence and behavioural intention. Figure 1 provides a visual representation of the primary constructs of the UTAUT model and their associated external moderating factors.

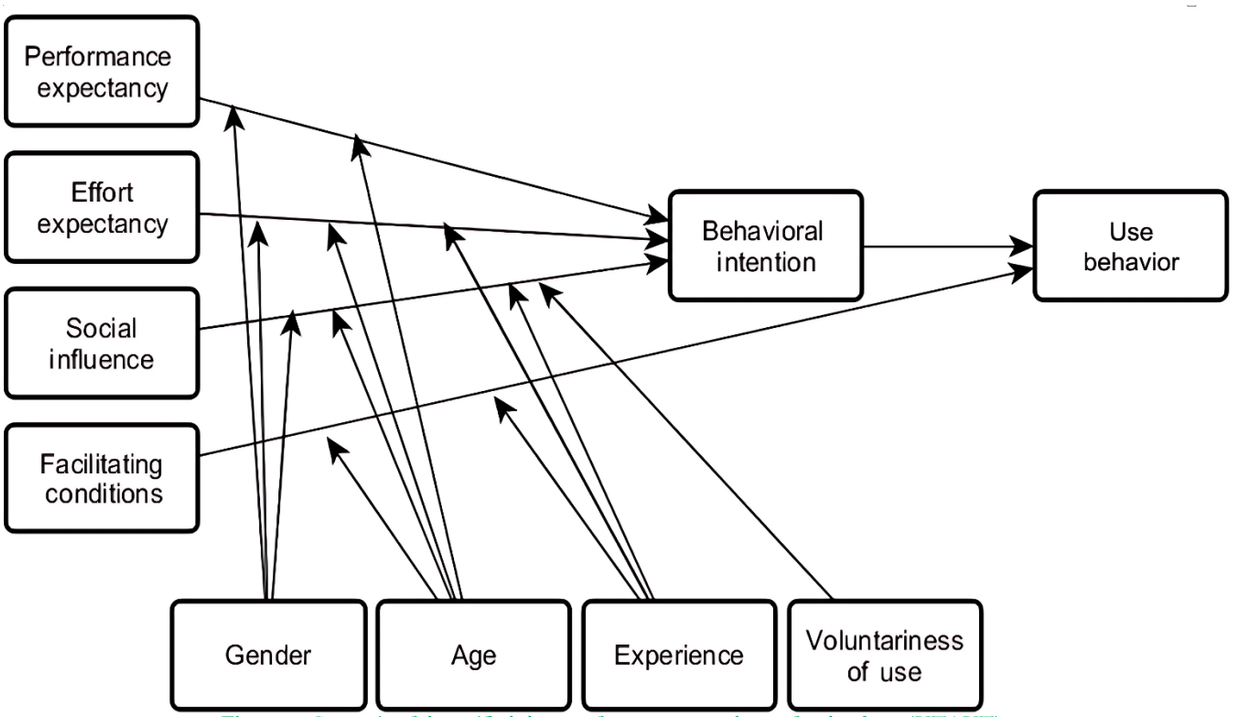

Figure 1. Synopsis of the unified theory of acceptance and use of technology (UTAUT).
Source: Venkatesh et al. (2003).

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The UTUAT model has gained prominence among scholars due to its enhanced comprehension of behavioural intention and technology usage in individual and organisational settings. The UTUAT model surpassed other theories of technology acceptance and use (Itasanmi et al., 2022). Empirical testing has demonstrated that the model effectively accounts for approximately 70% of technology acceptance behaviour (Venkatesh et al., 2003). However, the UTUAT model has been noted to either overestimate relationships that may not always be suitable or overlook certain relationships that could be crucial in elucidating behavioural intention and actual technology usage (Dwivedi et al., 2017). Venkatesh et al. (2003) recommended that future research should delve deeper into the complexities that may affect user acceptance of information technology. Thus, researchers were encouraged to identify and examine additional constructs that could improve the prediction of user intentions and use behaviours, going beyond the current understanding (Abdulwahab & Md Dahalin, 2010).

The rationale for employing the UTAUT model as the framework for this study is based on having a better construct through which predictors of an outcome variable in the technology-use domain could easily be understood. Additionally, the model offers researchers the flexibility to adapt its constructs to align with the specific context of their studies. Thus, this study adopts the UTUAT model and modifies it by substituting effort expectancy with technology self-efficacy (individuals' belief in their ability to accomplish specific tasks effectively using technology) and social influence with digital literacy (individuals' ability to evaluate, navigate, and interact effectively using digital technologies). This is based on the researchers' opinion that because the study focuses on investigating the predictors of online learning readiness, technology self-efficacy may better capture it. Technology self-efficacy reflects graduate students' confidence in navigating online learning platforms and using digital tools. In addition, online learning platforms require digital literacy skills (Itasanmi & Ajani, 2023). This is crucial for graduate students to engage effectively with online learning materials, discern reliable sources of information, and collaborate in the digital learning environment. This modified UTUAT model acknowledges the importance of individual competencies and broader digital literacy skills in shaping readiness and acceptance of online learning platforms. Thus, examining how these four determinants (performance expectancy, technology self-efficacy, digital literacy, and facilitating conditions) influence graduate students' readiness for online learning could provide insights into the factors that affect their online learning readiness. This could inform policy interventions and strategies to enhance their readiness for online learning experiences. Furthermore, the study omitted experience and voluntariness but added marital status to understand how the age, gender, and marital status of graduate students might influence the study's constructs. Figure 2 shows the modified UTUAT model used in this study.

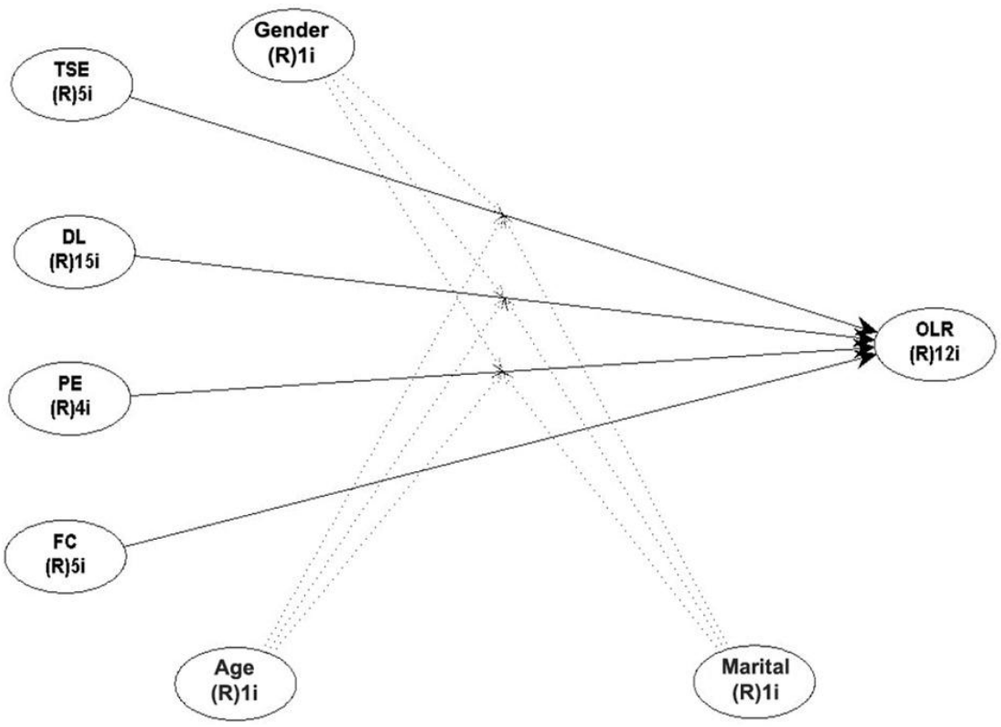

Figure 2. Modified UTUAT model for graduate students' online learning readiness.

2.1. Research Hypotheses

This study hypothesised that all four modified UTUAT constructs (technology self-efficacy, digital literacy, performance expectancy and facilitating conditions) would significantly and positively influence the graduate students' online learning readiness (OLR). In addition, the effects of age, gender, and marital status of the students were hypothesised to moderate the relationships among the study's constructs. The following hypotheses were derived and tested:

H_1: Technology self-efficacy positively influences OLR.
H_2: Digital literacy positively influences OLR.
H_3: Performance expectancy is positively influenced by the OLR.
H_4: Facilitating conditions positively influence OLR.
H_5: Age plays a significant moderating role in the relationship between technology self-efficacy and OLR.
H_6: Age significantly moderates the relationship between digital literacy and OLR.
H_7: Age plays a significant moderating role in the relationship between performance expectancy and OLR.
H_8: Marital status plays a significant moderating role in the relationship between technological self-efficacy and OLR.
H_9: Marital status plays a significant moderating role in the relationship between digital literacy and OLR.
H_{10}: Marital status plays a significant moderating role in the relationship between performance expectancy and OLR.
H_{11}: Gender plays a significant moderating role in the relationship between technological self-efficacy and OLR.

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H_{12}: Gender plays a significant moderating role in the relationship between digital literacy and OLR.
H_{13}: Gender plays a significant moderating role in the relationship between performance expectancy and OLR.

3. Methodology

3.1. Study Design

The study employed a quantitative research methodology and utilised a structural equation modelling (SEM) approach to understand the relationship between the five constructs: technology self-efficacy, digital literacy, performance expectancy, facilitating conditions, and online learning readiness which represents a modified UTUAT model. Data were gathered through a survey questionnaire comprising questions on demographics and multiple items for each construct.

3.2. Participants and Data Collection

Three thousand, one hundred and twenty graduate students at the University of Ibadan participated in the study through an invitation link to the electronic questionnaire sent to their e-mail by the postgraduate college of the university. Of the 3120 participants, 1608 were male and 1512 were female. Most participants (37.1%) were aged 26-30 while the majority (50.2%) was single. Table 1 presents the participants' demographic information.

Table 1. Demographic information of the participants

Variables	Number	(%)
Gender		
Female	1512	48.5
Male	1608	51.5
Age		
21-25	293	9.4
26-30	1159	37.1
31-35	608	19.5
36-40	363	11.6
41-45	256	8.2
46-50	197	6.3
51-55	136	4.4
56-60	74	2.4
> 60	34	1.1
Marital status		
Single	1565	50.2
Married	1518	48.7
Divorced/ separated/ widowed	37	1.2

3.3. Measures

This study used a structured questionnaire comprising two sections. The first section requested that participants provide demographic information, such as age, gender, and marital status. The second section contained 41 statements about the five constructs under investigation. The five constructs included technology self-efficacy (five items derived from Kass (2014)), digital literacy (15 items adapted from Liza and Andriyanti (2020), performance expectancy, and facilitating conditions (four and five items, respectively, drawn from Venkatesh et al. (2003), Teo (2011), Itasanmi et al. (2022) and Thomas, Singh, and Gaffar (2013) and online learning readiness (OLR) (12 items adapted from the online readiness assessment instrument developed by Williams and The Pennsylvania State University (2022). All items are rated on a five-point Likert scale with 5 = strongly agree/very high and 1 = strongly disagree/very low. The questionnaire was pilot-tested yielding a Cronbach's alpha coefficient of 0.83.

3.4. Ethical Approval

The ethical committee of the Department of Adult Education, University of Ibadan, Nigeria approved this study on 5 November 2023 (Ref. No. 2023/RB/04). However, informed consent was obtained from all participants, who were assured of the confidentiality of the information they provided before participating in the online questionnaire.

3.5. Data Analysis

The study adhered to a rigorous protocol for the SEM analysis. Initially, the data were screened to identify the missing data and outliers. Subsequently, both the convergent and discriminant validity of the data were assessed. WarpPLS software was used to conduct partial least squares structural equation modelling (PLS-SEM) analysis. Fit indices were computed between the measurement model and observed data to evaluate the model's quality before executing the structural model to examine the study's hypotheses.

4. Results

4.1. Measurement Model Results

Table 2 presents the results of Cronbach's alpha (CA), Composite Reliability (CR), Average Extracted Variance (AVE), and Variance Inflation Factor (VIF) tests conducted to confirm the reliability of the constructs to evaluate the validity and reliability of the measurement model. The findings revealed that all CA and CR values exceeded 0.7. This indicates robust evidence of reliability (Hair Jr, Sarstedt, Hopkins, & Kuppelwieser, 2014). Furthermore, convergent validity is deemed satisfactory when AVE equals or surpasses 0.5 (Hair et al., 2021). The results presented in Table 2 indicate that AVE values exceeded 0.5. Additionally, VIF was computed for each of the constructs to ensure the absence of multicollinearity in the measurement model. The findings revealed that the VIF values ranged from 1.062 to 1.959, below 0.4. These results suggest that the measurement constructs are reliable and collinearity issues do not affect the observed constructs.

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Table 2. Measurement model

Constructs	Cronbach's alpha (CA) (>0.70) *	Composite reliability (CR) (>0.70) *	Average variance extracted (>0.50) *	VIF (<0.50) *
TSE	0.932	0.908	0.733	1.245
DL	0.951	0.944	0.564	1.939
PE	0.923	0.888	0.750	1.454
FC	0.922	0.894	0.702	1.062
OLR	0.905	0.915	0.501	1.959

Note: TSE: Technology self-efficacy; DL: Digital literacy; PE: Performance expectancy; FC: Facilitating conditions; OLR: Online learning readiness. *Acceptable levels of reliability or validity, according to Hair Jr et al. (2014) and Hair et al. (2021).

4.2. Convergent Validity

The constructs' structures and cross-loadings were computed to assess the convergent validity of the items as shown in Table 3. The results in Table 3 indicate that all cross-loading values exceeded 0.5, signifying that the measurement constructs were both valid and convergent. The model excludes all variables with factor values (loadings) lower than 0.5.

Table 3. Structure and cross-loadings of variables in the measurement model

Constructs	Items	TSE	DL	PE	FC	OLR
TSE	TSE1	0.846	0.230	0.229	0.005	0.239
	TSE2	0.789	0.335	0.236	0.019	0.302
	TSE3	0.880	0.245	0.205	0.021	0.242
	TSE4	0.880	0.328	0.261	0.057	0.310
	TSE5	0.881	0.343	0.222	0.018	0.316
DL	DL1	0.291	0.766	0.224	0.034	0.472
	DL2	0.250	0.635	0.181	0.003	0.428
	DL3	0.266	0.770	0.246	0.030	0.499
	DL4	0.240	0.786	0.258	0.057	0.490
	DL5	0.236	0.742	0.253	0.074	0.459
	DL6	0.248	0.727	0.251	0.062	0.422
	DL7	0.248	0.769	0.248	0.096	0.475
	DL8	0.294	0.846	0.262	0.059	0.517
	DL9	0.265	0.779	0.187	0.019	0.484
	DL10	0.280	0.836	0.265	0.060	0.506
	DL11	0.257	0.741	0.235	0.043	0.454
	DL12	0.252	0.799	0.221	0.060	0.493
	DL13	0.262	0.683	0.226	-0.007	0.473
	DL14	0.273	0.699	0.211	0.009	0.491
	DL15	0.229	0.644	0.262	0.119	0.418
PE	PE1	0.282	0.283	0.798	0.124	0.417
	PE2	0.252	0.296	0.887	0.153	0.431
	PE3	0.204	0.249	0.893	0.223	0.378
	PE4	0.201	0.260	0.883	0.244	0.390
FC	FC1	0.010	0.030	0.197	0.788	0.087
	FC2	0.047	0.071	0.197	0.855	0.132
	FC3	0.013	0.060	0.170	0.863	0.102
	FC4	0.030	0.049	0.169	0.836	0.112
	FC5	0.018	0.058	0.175	0.847	0.102
OLR	OLR2	0.257	0.379	0.446	0.097	0.715
	OLR3	0.282	0.469	0.333	0.004	0.742
	OLR4	0.299	0.502	0.346	0.023	0.768
	OLR5	0.264	0.609	0.301	0.088	0.744
	OLR6	0.189	0.334	0.330	0.112	0.662
	OLR7	0.228	0.474	0.269	0.046	0.695
	OLR9	0.167	0.393	0.350	0.193	0.660
	OLR10	0.163	0.333	0.302	0.174	0.611
	OLR11	0.196	0.407	0.287	0.120	0.653
	OLR12	0.234	0.470	0.294	0.070	0.728

4.3. Discriminant Validity

Inter-construct correlations were used to evaluate the constructs' discriminant validity. This involved comparing the square root of the AVE for a specific construct with the correlations between that construct and other constructs. As shown by the square root of the AVE values (bold diagonal values) in Table 4, discriminant validity was confirmed across all assessment items as the AVE values exceeded the off-diagonal elements in the respective rows and columns. This indicates that each construct exhibits stronger correlations with its indicators than with the indicators of the other constructs in the model. Therefore, a structural equation model can be fitted because the reliability tests and discriminant validity are deemed adequate.

Table 4. Discriminant validity for the measurement model

Constructs	TSE	DL	PE	FC	OLR
TSE	0.856	0.346	0.269	0.028	0.329
DL	0.346	0.751	0.313	0.064	0.629
PE	0.269	0.313	0.866	0.216	0.466
FC	0.028	0.064	0.216	0.838	0.128
OLR	0.329	0.629	0.466	0.128	0.708

Note: Diagonals in bold are square roots of the AVE values from observed variables.

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4.4. Model Fit Results

Various measures were assessed to determine whether the model met the necessary cut-off points for model diagnostics. Table 5 summarises the model fit indices for the structural model. The results in Table 5 demonstrate that all the obtained values met the recommended criteria. The outcomes of the different fit indices as presented in Table 5 suggest that the research model fits well. Consequently, the model can be used to make accurate predictions.

Table 5. Fit Indices results

Indices	Decision criteria	Comment
Average path coefficient (APC) = 0.084	P < 0.001	Significant
Average R-squared (ARS) = 0.510	P < 0.001	Significant
Average adjusted R-squared (AARS) = 0.508	P < 0.001	Significant
Average block VIF (AVIF) = 2.066	Acceptable if < = 5 and ideally if < = 3.3	Ideally
Average full collinearity VIF (AFVIF) = 1.599	Acceptable if < = 5 and ideally if < = 3.3	Ideally
Tenenhaus GoF (GoF) = 0.676	Small if > = 0.1, medium if > = 0.25 and large if > = 0.36	Large
Sympson's paradox ratio (SPR) = 0.923	Acceptable if > = 0.7 and ideally if = 1	Acceptable
R-squared contribution ratio (RSCR) = 0.988	Acceptable if > = 0.9 and ideally if = 1	Ideally
Statistical suppression ratio (SSR) = 1.000	Acceptable if > = 0.7	Acceptable
Non-linear bivariate causality direction ratio (NLBCDR) = 0.846	Acceptable if > = 0.7	Acceptable
Standardized root mean squared residual (SRMR) = 0.052	Acceptable if < = 0.1	Acceptable
Standardized mean absolute residual (SMAR) = 0.040	Acceptable if < = 0.1	Acceptable

4.5. Hypotheses Testing Results

The results shown in Table 6 indicate that the data supported seven out of the thirteen hypotheses. All hypotheses relating to the direct relationship between technology self-efficacy (TSE), digital literacy (DL), performance expectancy (PE), facilitating conditions (FC), and OLR were supported. Among the moderating variables, marital status and gender were identified as moderators of the relationship between DL and OLR. In addition, marital status moderated the relationship between PE and OLR. Table 6 illustrates that hypotheses H1, H2, H3, H4, H9, H10, and H12 are supported and statistically significant at the 10% level while hypotheses H5, H6, H7, H8, and H11 are found to be statistically insignificant.

Table 6. Hypotheses testing results

Hypothesis	Relationship	Coefficient	P-values	Decision
H_1	TSE > OLR	0.170	< 0.001	Supported
H_2	DL > OLR	0.411	< 0.001	Supported
H_3	PE > OLR	0.262	< 0.001	Supported
H_4	FC > OLR	0.036	< 0.023	Supported
H_5	TSE > age > OLR	0.019	> 0.146	Not supported
H_6	DL > age > OLR	0.022	> 0.110	Not supported
H_7	PE > age > OLR	-0.010	> 0.289	Not supported
H_8	TSE > marital > OLR	0.007	> 0.355	Not supported
H_9	DL > marital > OLR	-0.033	< 0.035	Supported
H_{10}	PE > marital > OLR	-0.024	> 0.089	Not supported
H_{11}	TSE > gender > OLR	-0.002	> 0.453	Not supported
H_{12}	DL > gender > OLR	0.075	< 0.001	Supported
H_{13}	PE > gender > OLR	-0.016	> 0.180	Not supported

4.6. SEM with Parameters

Figure 3 illustrates that the independent variables (TSE, FC, DL, and PE) explained 51% (R2 = 0.51) of the total variance in the OLR. This shows that the model is strong and has good predictive potential.

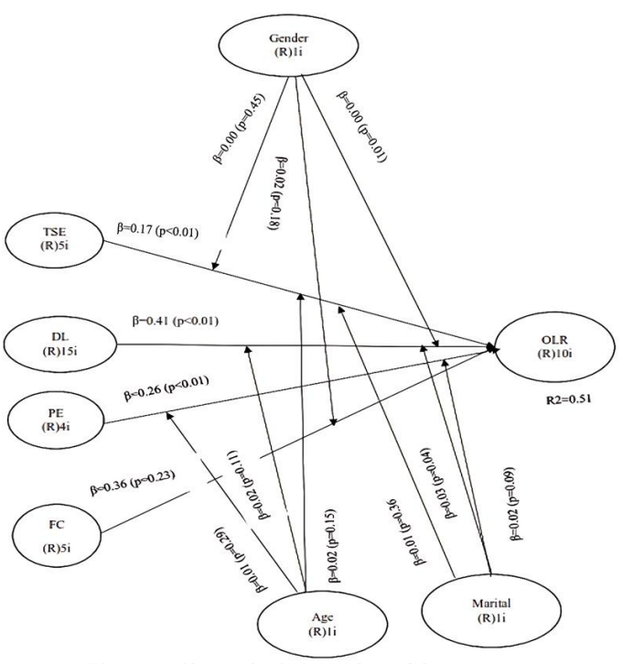

Figure 3. Shows the SEM with model parameters

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5. Discussion and Implications

This study examines graduate students' readiness for online learning using a modified UTUAT model. The findings revealed that the four modified UTUAT model constructs (technology self-efficacy, digital literacy, performance expectancy, and facilitating conditions) positively and significantly influenced graduate students' readiness for online learning. This result aligns with the research findings of Ibrahim et al. (2022), Pham and Dau (2022) and Hoang and Hoang (2023). This result implies that graduate students who possess higher levels of technology self-efficacy and digital literacy will have increased confidence in navigating online learning platforms, discern credible sources, and collaborate better with peers in the online environment (Itasanmi & Ajani, 2023). Moreover, when graduate students perceive online learning as valuable and effective for achieving their learning goals, there are adequate facilitating conditions that could support their online learning. They are likely to be more motivated to engage in the online learning process. This result highlights the importance of supporting and building graduate students' confidence in navigating online learning platforms. It also emphasizes the need to foster a supportive and inclusive learning environment that aligns their expectations with their experiences, ultimately enhancing their readiness for online learning.

Furthermore, the findings revealed that among the four modified UTAUT constructs, digital literacy is the most prominent factor influencing graduate students' readiness for online learning. This result aligns with the research findings of Khulwa and Luthfia (2023) who identified students' existing digital literacy skills as a primary determinant of their preparedness for online learning. This finding underscores the importance of enhancing students' digital literacy to improve their readiness for online learning. While technology self-efficacy, performance expectancy, and facilitating conditions also play significant roles in shaping graduate students' readiness, digital literacy serves as a foundational skill set that enhances their ability to navigate and engage effectively with online learning environments (Tang & Chaw, 2016).

The moderating effects of age, gender, and marital status on the relationship between the four modified UTAUT constructs and graduate students' readiness for online learning revealed that gender positively moderates the relationship between digital literacy and online learning readiness. On the other hand, marital status negatively moderates the relationship between digital literacy and readiness for online learning as well as between performance expectancy and online learning readiness. These findings align with prior research findings (Firat & Bozkurt, 2020; Itasanmi et al., 2022; Venkatesh et al., 2003; Walia, Tulsi, & Kaur, 2019). However, they contrast with the results of Chung et al. (2020) who found that gender does not moderate students' online readiness. The results emphasize the need to address gender disparities in technology use, the influence of marital status on graduate students' digital literacy skills, and their perception of the usefulness of online learning platforms. The findings suggest that while graduate students may possess strong digital literacy skills and recognize the benefits of online learning, married students may face challenges in fully engaging with online learning due to family responsibilities. In contrast, single students may have greater flexibility in managing their time and accessing support resources. Therefore, understanding the impact of gender and marital status on online learning readiness can help address barriers affecting graduate students' acceptance, adoption, and use of online learning platforms.

Moreover, the study's findings demonstrate that the constructs of the modified UTUAT model accounted for 51% of the variance in graduate students' readiness for online learning. This suggests the modified UTUAT model aptly encompasses the essential factors influencing graduate students' online learning readiness. However, the modified UTUAT model was below the original model's explanatory power of 69% (Venkatesh et al., 2003). However, it is within the range of explanatory power reported in previous studies (Kurniawan et al., 2021; Zuiderwijk et al., 2015) that utilised a modified UTUAT model. This implies that the modified model has good predictive potential and researchers can refine and validate it to improve its predictive power and applicability across different contexts and populations.

6. Conclusion

This study proposes a model designed to explore the factors that influence graduate students' readiness for online learning. The study successfully identifies and explains key factors affecting graduate students' preparedness for online learning by employing a modified version of the Unified Theory of Acceptance and Use of Technology (UTAUT) model as its analytical framework. Consequently, the proposed model was validated. The findings highlight that while technological self-efficacy, digital literacy, performance expectancy, and facilitating conditions all significantly impact online learning readiness, digital literacy emerges as the most influential factor. Furthermore, gender was found to moderate the relationship between digital literacy and readiness for online learning. In contrast, marital status negatively moderated the relationships between digital literacy and readiness for online learning, as well as between performance expectancy and online learning readiness.

This study suggests that adequate attention should be given to the identified factors for adequate support for graduate students in their transition to and success in the online learning environment. Prioritizing the development of digital literacy skills is of utmost importance. This is crucial for enhancing the readiness of graduate students for online learning. Thus, institutions of higher learning should endeavor to boost students' confidence in technology use and provide appropriate support mechanisms, such as resources, infrastructure, and support services, to facilitate online learning experiences and integrate digital literacy components into curricula across disciplines. This can help to create inclusive, supportive, and engaging online learning environments that will enhance graduate students' readiness for success in both academic and professional pursuits. In addition, higher institutions should implement strategies, such as flexible learning options and personal academic advice to ensure work-life balance for married students.

Furthermore, institutions should promote gender-inclusive approaches to online learning to address gender disparities and equity in online learning environments. This study recommends that researchers expand upon the modified UTUAT model by incorporating additional constructs that contribute most significantly to understanding students' online learning readiness. This may help improve the explanatory power of the model and expand the scope of predictors of online learning readiness across different geographic contexts and populations.

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7. Limitations and Suggestions for Further Studies

This study had certain limitations. First, the study's purposeful use of graduate students from one university, among many other universities in the country, limits the generalisability of the results beyond the sampled population. Future studies should endeavor to obtain representative samples of broader graduate students nationwide. Second, the study measured technology self-efficacy, digital literacy, performance expectancy, facilitating conditions, and online learning readiness from the respondents' perspective using a quantitative approach. This might have led to self-reporting bias. Future research should adopt triangulation to reduce reliance on self-reporting while self-reporting bias may not be eliminated. This might help to strengthen the validity and reliability of the study's results. This study used a modified UTUAT model rather than the original version, which might have affected the explained variance. Future research should focus on conducting cross-cultural evaluations of the modified UTUAT model to validate and enhance the existing understanding of students' readiness for online learning.

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