Journal of Information Systems and Informatics
Vol. 7, No. 1, March 2025 e-ISSN: 2656-4882 p-ISSN: 2656-5935
DOI: 10.51519/journalisi.v7i1.999 Published By DRPM-UBD

Impact Assessment of Digital Learning Tools in South African Higher Education

Dorcas Oladayo Esan[1], Themba Masombuka[2]

[1]Department of Information Systems, University of South Africa, South Africa
[2]Department of Computer Science, University of South Africa, South Africa
Email: [1]oladayojadesola10@gmail.com, [2]masomkt@unisa.ac.za

Abstract

Technological advancements have significantly reshaped the operational landscape of tertiary institutions, enhancing both student and academic efficiency processes. In South Africa, many students in higher learning institutions scrambled to use technology for teaching and learning due to load shedding, poor internet connectivity, lack of technological skills, lack of technology training by the tertiary institutions, etc. This study employs the UTAUT to understand better how technological innovations impact South African higher institutions. The UTAUT model includes components such as effort expectancy, self-awareness, social influence, facilitating conditions, and voluntary use to fully understand the factors influencing technology development and adoption. Three hundred and ten (N=310) students from underprivileged tertiary institutions in the Eastern Cape participated in this study. The study used a quantitative research methodology based on a 5-point Likert scale to gauge the respondents' intention to use technology for teaching and learning. Regression analysis and NOVA statistical tools were used to analyse the acquired data. The findings revealed that most participating students believe that technological advancements had a positive impact on their ability to teach and learn. The research findings imply that faculty should implement training programs on digital tools, improve IT infrastructure, provision of free internet bundles, and develop policies that support the adoption of e-learning technologies.

Keywords: Technological development, Tertiary institution, e-learning, UTAUT, Digital learning.

1. INTRODUCTION

The rapid advancement of e-learning technology has transformed the educational landscape, particularly in tertiary institutions, where it is reshaping how students learn, and lecturers teach according to [1]. The significance of e-learning in higher education is profound, as it offers a dynamic platform that supports a wide range of learning styles, provides access to global resources, and breaks down traditional barriers associated with time and location [2]. According to [3], e-learning technology has become an integral component of tertiary education, but despite its potential to transform teaching and learning, it faces several challenges that can impact its effectiveness. The opacity of the e-learning technology requires the users

to have the technical knowledge (digital literacy) to use the platform effectively, which most students in tertiary institutions, particularly students from rural institutions do not have [4].

Another challenging problem as reported by [5], is the student accessibility to the basic technology needed for education, such as computer devices, and reliable internet connections, and the high cost of internet bundles restricts students from accessing necessary educational resources, particularly if the learning management system (LMS) materials involve high data consumption (e.g. video lectures, online quizzes or large files downloads) leading to a digital divide among the students, consequently affecting the acceptability of e-learning by some students in tertiary institutions. Authors [6] confirm that the swift uptake of e-learning platforms frequently pressures institutions to invest in or sustain expensive infrastructure. Additionally, both students and lecturers may face challenges with digital literacy, which can impact the quality and engagement of learning experiences. Furthermore, frequent power outages (load shedding) often distrust students' ability to join classes. For instance, unstable power can impact student's internet connection quality causing disconnection and leading to missed information during lectures. Authors in [7] agreed that most students from underprivileged higher institutions are from rural areas where there are poor or no network connections. Consequently, discourages students from fully participating, limiting their engagement and leading to low effective learning outcomes.

Despite these challenges, the significance of advancing e-learning technology in tertiary institutions cannot be overstated. E-learning enables institutions to offer a flexible, adaptable approach to education, allowing students to learn at their own pace and from virtually anywhere [3]. This flexibility is particularly valuable for students with varied schedules, including working professionals, parents, or those living far from campuses, who may otherwise find it difficult to pursue tertiary education. This study therefore leverages the concept of the UTAUT model framework that integrates the cost of load shedding and the cost of internet bundles as part of factors that affect the student's acceptance of e-learning in tertiary institutions. The UTAUT model is suitable for this study due to its ability to predict human intentions and behaviours toward technology adoption.

The UTAUT model is created by addressing the gaps mentioned earlier and the related research questions, resulting in the following contributions. Based on the background information, this study asks: What factors influence students to adopt technological innovations in higher education institutions?

1) The creation of a new framework combines the cost of internet bundles and load shedding, using the UTAUT model to provide a thorough understanding of the factors that affect students' adoption of e-learning in tertiary institutions.

2) Enhanced accessibility and flexibility to determine how e-learning technology allows students to access educational materials anywhere and anytime.
3) Technological development in tertiary institutions contributes to how student success in teaching and learning.

The remainder of the paper is laid out as follows: Section 1.1 gives the research questions and contributions. Section 2 provides the method, section 3 presents the results, section 4 presents discussion of findings, and section 5 concludes the study.

2. METHODS

This study uses the quantitative research method. The quantitative method was chosen because it is well-suited for testing hypotheses, analyzing relationships, and generalizing findings to a larger population. The research population was undergraduate students from Walter Sisulu University (WSU) which is one of the historically disadvantaged universities in South Africa. The students were from the department of Information Technology and these students used e-learning technology for their course.

2.1. The Research Model and Hypotheses

The variables and relationships utilised in the UTAUT framework used in this research are outlined. Three primary relationships to examine include those between the independent variables facilitating conditions (FC), effort expectancy (EE), self-awareness (SA), voluntariness of use (VU), familiarity, financial cost, performance expectancy (PE), social influence (SI), the dependent variables, intention to use (INT) and success in higher tertiary education (HTE). Studies conducted by [8, 9] indicate the high tertiary success rate significantly impacts students' willingness to embrace e-learning technologies. Furthermore, it is anticipated that lower financial cost of internet bundle, social influence (SI), facilitating conditions (FC), and self-awareness (SA) will correlate with greater intentions among users to accept e-learning technologies for their studies as illustrated in Figure 1. Based on Figure 1, the relationship between the intention to use e-learning (INT) and facilitating conditions (FC) is significant and positive in the UTAUT2 model according to [10]. In the context of e-learning technology usage, the students are considered to be consumers (as in the UTAUT 2 settings) who have easy access to information about the technology through adequate resources, infrastructure, and technical assistance. Moreover, the facilitating conditions variable is a determinant of use behavior. Thus, the following hypotheses were formulated:

H1: The relationship between the intention to use e-learning (INT) and the facilitating condition (FC) is positively significant.

In [11] confirmed the robustness of the effort expectancy (EE) in Fig 1. To have a strong effect on the intention to use e-learning (INT) for experienced students, and other students who have little experience with e-learning technology. Therefore, for the e-learning technology, the following hypotheses were proposed.

H2: The relationship between intention to use e-learning (INT) and effort expectancy (EE) is positively significant.

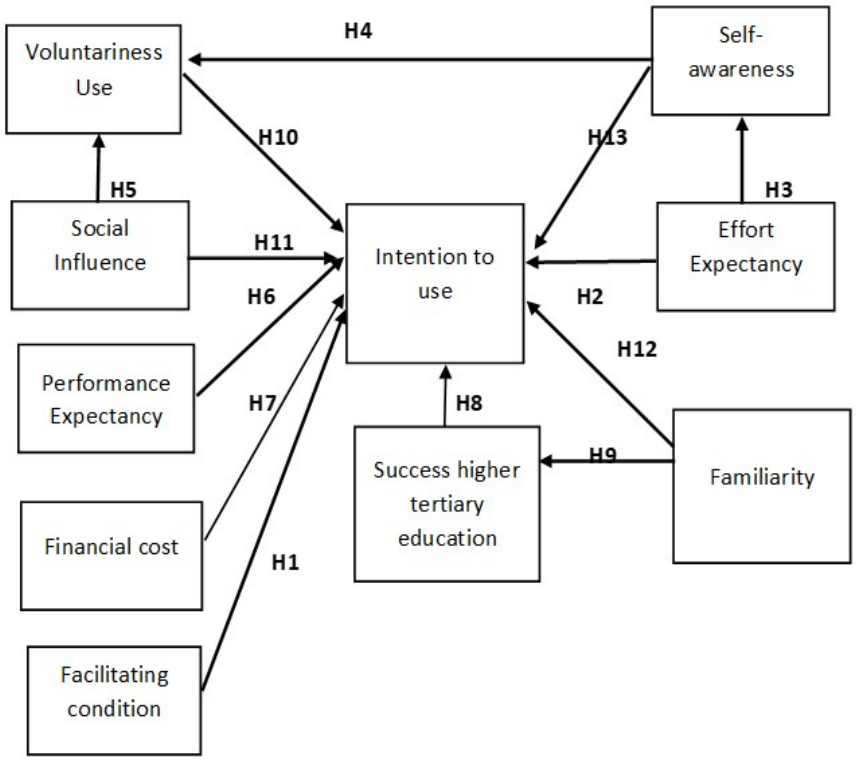

Figure 1. Research model

Effort expectancy (EE)) and self-awareness (SA) have a positive relationship because students who see the efficiency, effectiveness and productivity of the technology are more likely to develop an interest in the technology and because of their lack of technology know-how strengths, they tend to seek assistance on how to use the tools to enhance their educational experience. Therefore, the following hypothesis was proposed.

H3: Effort expectancy (EE) and self-awareness (SA) are positively significant.
Self-awareness (SA) and voluntariness of use (VU) have a positive relationship in underdeveloped tertiary institutions because when students and lecturers

voluntarily choose to adopt e-learning, they are more likely to be motivated and committed to using the technology. Thus, the following hypothesis is formulated.

H4: self-awareness (SA) and voluntariness use (VU) have a positive relationship.
The relationship between voluntariness of use (VU) and social influence (SI) is significant and positive in underdeveloped tertiary institutions because when students, lecturers, or university leaders encourage the adoption of e-learning technology, students are more likely to perceive it as a socially accepted and valuable tool. Therefore, for the e-learning technology, the following hypothesis is proposed.

H5: The relationship between voluntariness of use (VU) and social influence (SI) is positively significant.
Intention to use e-learning (INT) and perceived expectancy (PE) were found to be related [12]. Because they see the benefits of increased productivity, efficiency, and effectiveness, students are keen to embrace e-learning technology. Consequently, it is hypothesized that students will be more likely to use e-learning technology if they anticipate performing better while doing so. Thus, the following hypotheses were proposed:

H6: The connection between performance expectancy (PE) and intention to use e-learning (INT) is positive.
Affordability to technology, constant electricity supply, and internet resources play a crucial role in the relationship between intention to use e-learning (INT) and financial cost. The positive relationship between these two variables was significantly stronger when the internet bundle was cheaper, and there was no load-shedding, [13]. Therefore, for the e-learning technology, we proposed the following hypothesis.

H7: The relationship between intention to use e-learning (INT) and financial cost is positively significant.
Previous research by [14, 15] confirmed in various settings that success in higher tertiary education (HTE) has a strong significant and positive relationship with the intention to use e-learning (INT). Students consider the intention to use e-learning technology and expect the technology to enhance their performance. Thus, the following hypothesis is proposed.

H8: The relationship between success in higher tertiary education (HTE) and the intention to use e-learning (INT) is positively significant.
The prior knowledge of the e-learning technology plays an important role in the relationship between familiarity and success in higher tertiary education (HTE). The positive relationship between these two variables was significantly strong because students who are comfortable with e-learning technology are more likely

to use them effectively, leading to better academic outcomes. Therefore, we proposed the following hypothesis.

H9: There is a relationship between familiarity with e-learning technology and success in higher tertiary education (HTE).

In voluntary settings**,** positive attitudes toward e-learning, such as perceiving it as beneficial, user-friendly, and aligned with personal goals, strongly enhance INT. Social influence plays a lesser role since the decision is personal rather than externally driven. Hence, leads to the following hypothesis.

H10: The relationship between the intention to use e-learning (INT) and the voluntariness of use (VU) is positively significant.

When people perceive encouragement or approval from influential figures, it strengthens their intention to use e-learning, especially if the individual values the opinions of those figures. This leads to the following hypothesis.

H11: The relationship between the intention to use e-learning (INT) and the social influence (SI) is positively significant.

Familiarity reduces anxiety and increases confidence, making users more likely to form intentions to adopt e-learning technology, which leads to the following hypothesis.

H12: The relationship between the intention to use e-learning (INT) and familiarity is positively significant.

High self-awareness enhances confidence in using e-learning systems, which strengthens the intention to adopt them. This leads to the following hypothesis.

H13: The relationship between the intention to use e-learning (INT) and self-awareness (SA) is positively significant.

The steps involved in addressing the proposed hypothesis using quantitative research methodology are shown in Figure 2.

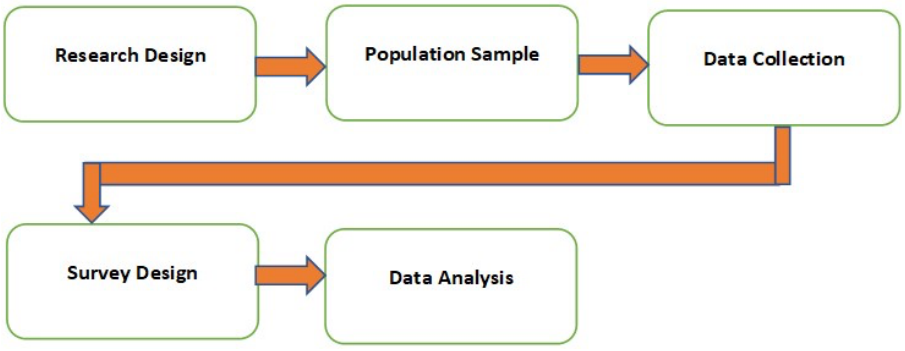

Figure 2. Research methodology steps

2.2. Research Design

The study collected data through a cross-sectional survey approach as part of a quantitative research design. This design is suitable for investigating how variables like performance expectancy, effort expectancy, social influence, facilitating conditions, behavioural intention, and usage behaviour relate to one another as described in the unified theory of acceptance and use of technology (UTAUT) framework.

2.3. Population Sample

The study population sample for this study represents all students enrolled in the Department of Information Technology at WSU who were directly involved in using e-learning technology for their studies. Since there are too many students at WSU for this population to be studied at this level, it would be impossible to include them all. This population was proportionately distributed after being selected using the [16] criteria. The goal is to gather information from the chosen representatives of the population. A nonprobability sampling technique was applied in this study. Using this sampling technique allowed the researcher to recruit participants from WSU. According to the standards and guidelines established by [17], the sample size of 450 respondents was considered appropriate for this study. Of the 450 requests sent to respondents, only 320 completed the questionnaire satisfactorily.

2.4. Data Collection

This survey, which uses a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), was created based on the UTAUT item model by [18]. A measure used in the study by [43] served as the model for the Likert scale. Financial cost, social influence (SI), facilitating conditions (FC), performance expectancy (PE), effort expectancy (EE), and intention to use (INT) variables were among the instruments. All instruments had shown acceptable levels of validity and reliability based on previous research [19, 20].

2.5. Survey Design

This survey was used to design statement-based questions that were included in the survey, leading to the final set of 60 questions. The survey was subdivided into two sections. To collect data on the moderating effects of the proposed framework, respondents were asked to answer demographic questions in Section A of the questionnaire, which included four variables: gender, age, role, and experience. In Section B, questions regarding the acceptance of e-learning technologies were included. This section asked participants to assess their

perceptions of using e-learning technologies for teaching and learning. The questionnaire comprised a series of self-completion questions that respondents were expected to complete online. The questionnaire was created and distributed to participants using Google Forms. The survey instrument consisted of 60 statements in total, and all exhibited acceptable levels of construct validity and reliability, as confirmed by prior studies conducted by [21] and [22]. The survey instrument underwent validity and reliability testing. To evaluate the internal consistency of the suggested decision variables and to test for the reliability of the research instrument items, Cronbach's alpha (α) was calculated [23]. For the reliability test, the actual Cronbach's alpha (α) value obtained for this study was calculated at 0.92 for all constructs which was satisfactory as it exceeds 0.6 as recommended by [24]. Descriptive statistics is used to compute the frequencies, means, and standard deviation of the items in the questionnaire. Lastly, the validity of the hypotheses was then examined using a regression analysis.

2.6. Analysis of Data

The statistical package for the social sciences (SPSS) was used to analyze the data gathered for this investigation. The collected data was evaluated using the proper statistical methods. The SPSS is easy to use for the effective analysis of quantitative data and helps the researcher face any difficulties during the process of analyzing data. SPSS requires defining a set of variables and further creating cases by suitable input of data within these variables. Such as the independent variables, dependent variables, intervening variables, and moderator variables. In a simple term, an independent variable is a cause and its value is independent of any other variables in a study. Whereas, a dependent variable is an effect, whose value depends on any changes in the independent variable. In the case of an intervening variable (sometimes called mediating variable), it refers to a hypothetical variable, that is usually used to explain causal links between other variables within research. Lastly, the moderating variable is that variable that can alter the association between independent and dependent variables. The percentages and frequencies of the demographic profiles of the respondents were displayed using a descriptive statistical approach. To investigate the connections between the variables, correlation analysis was done. The model was tested using regression analysis and analysis of variance (ANOVA). The primary emphasis of the study's analysis was on students' intentions to use e-learning technologies for instruction.

3. RESULT AND FINDINGS

This section presents the results and findings obtained from this study while using the proposed UTAUT model to investigate the impact of digital technology in one of the tertiary institutions in South Africa.

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

3.1. Respondent's Demographic Profile

The respondents' demographic data is shown in Table 1. Of those involved, 45.2% were men and 54.8% were women. The age distribution of the participants was as follows: the age group (17-20) were 21.9%, the age group (21-30) were 51.9%, the age group (31-40) was 22.4%, and the age group (40 and above) were 31.9%. It is worth noting that the majority age group (21-30) were the predominance group using e-learning for teaching and learning. Participants with an educational qualification for a bachelor's degree accounted for 17.4%, and 46.1% of the participants were pursuing a diploma degree. The percentage of participants with graduate degrees was 9.4%. The percentage of people enrolled in Honors programs was 14.8%. Master's and PhD holders made up 11.3 % and 11.0%, respectively. From this, it can be seen that participants with diploma degrees are the majority group that used e-learning for their teaching and learning.

Participants' experience with e-learning between 3 Months and 6 Months accounted for 8.1%. Those with 6 months to 1 year experience accounted for 28.1%. Those who have not used e-learning before (no e-learning experience) accounted for 4.2%. Most participants (54.8%) indicated that they have over 1 year of experience with e-learning for teaching and learning. Those participants with under 3 months of experience accounted for 4.8%. From this result, the predominance were the participants with over 1 year of e-learning. The potential implication of a high percentage of participants with e-learning experience might have a more favorable view of technology, as they will likely have become accustomed to using digital tools for educational purposes which might influence their perceptions of the technology.

Table 1. The respondents' demographic composition

Demographics	Frequency	Percentage
Gender		
Female	170	54.8
Male	140	45.2
Age		
17 – 20	68	21.9
21 – 30	161	51.9
31 – 40	69	22.3
Above 40	12	3.9
Qualification		
Diploma	143	46.1
Honor's Degree	46	14.8
Bachelor's Degree	54	17.4
Graduate Degree	29	9.4
Master's Degree	34	11.0

PhD degree	4	1.3
Experience		
No experience	13	4.2
Under 3months	15	4.8
3-6months	25	8.1
6months - 1year	87	28.1
Over 1 year	170	54.8

3.2. Reliability and Correlation Analysis

This study employed construct validity to determine the extent of correlation between the decision variables and other measures that are theoretically expected to be related to them. Before testing for construct validity and correlation, the decision variables were assessed for reliability. The internal consistency of these variables was evaluated using Cronbach's alpha (α) and correlation matrix, as noted by Willems et al. [25]. The questionnaire items underwent an item analysis to evaluate the internal consistency of the decision variables. Cronbach α values, which indicate the reliability of the questionnaire, were obtained by performing this analysis for each construct. Items in the questionnaire were either included or excluded based on the following three criteria:

1) A Cronbach alpha (α) greater than 0.9 ($\alpha > 0.9$) was viewed as indicating strong reliability.
2) A Cronbach alpha (α) ranging from 0.7 to 0.8 was seen as acceptable reliability.
3) A Cronbach alpha (α) below 0.6 ($\alpha < 0.6$) was regarded as indicating unacceptable poor reliability.

A summary of the reliability data for each component factor of the research instrument is provided in Table 2.

Table 2. Reliability of measurements

Construct Factors	Cronbach's Alpha (α)
Con_ 1: self-awareness (SA)	0.905
Con_ 2: familiarity	0.908
Con_3: performance expectancy (PE)	0.926
Con_ 4: effort expectancy (EE)	0.836
Con_ 5: success higher tertiary education (HTE)	0.921
Con_ 6: social influence (SI)	0.922
Con_7: intention to use (INT)	0.873
Con_ 8: facilitating condition (FC)	0.922
Con_ 9: voluntariness use (VU)	0.804
Con_ 10: financial cost	0.904

Table 2 displays Cronbach's alpha (α) values for the items associated with each construct. It is important to note that only the items deemed acceptable are included in these tables. A Cronbach α greater than 0.9 is considered to indicate strong reliability, as it demonstrates high internal consistency among the items within a construct, [26]. Most constructs achieved strong reliability ($\alpha > 0.9$), including performance expectancy (0.926), social influence (0.922), and facilitating conditions (0.922). This indicates that the items within these constructs are highly consistent. The constructs such as voluntariness of use ($\alpha = 0.804$) have a lower threshold which is still acceptable reliability and sufficient for this study.

3.3. Correlation Analyses

A correlation matrix was computed to assess the degree of relationship between various constructs. The correlation coefficient (r) shows the strength of the relationship between two numerical variables, and correlation is a statistical measure of the linear relationship between two variables, according to [27]. The magnitude of r signifies the degree of correlation between the two variables. Consequently, a stronger relationship exists when r has a greater absolute value. The following guide was used for this study:

1) 1 denotes a perfect correlation.
2) 0.90 indicates a high degree of correlation.
3) A correlation of 0.50 is considered moderate.
4) A weak correlation is indicated by a value of 0.20
5) 0 indicates no correlation.

Table 3 provides the results of correlation analysis to verify the proposed relationship among variables. A significant strong positive correlation between FC and INT was found, with $r = 0.608$ and $p < 0.0001$.

The investigation of potential correlations between the various variables was done using a Pearson correlation analysis. The variables observed were SA, HTE, financial cost, FC, SI, VU, PE, familiarity, EE, and INT. All of the variables correlate to one another at $r = 1$, according to the Pearson correlation results. The association between FC and INT showed a strong positive correlation with $r = 0.608$ and $p < 0.0001$.

Positive, meaningful relationships with a moderate level of intensity fall into the second category of relationships. Significant at $p < 0.0001$, these relationship strengths fall within the range of $0.409 > r < 0.575$. These relationships in their decreasing order are between: VU and INT (0.557), VU and HTE (0.507), HTE and EE (0.498), HTE and SA (0.485), FC and HTE (0.457), financial cost and FC (0.453), HTE and familiarity (0.450), PE and HTE (0.450), VU and FC (0.447),

familiarity and PE (0.421), INT and SA (0.412), PE and SA (0.409), HTE and PE (0.408).

Table 3. Correlation matrix

	Self Awareness	Familiarity	Performance Expectancy	Effort Expectancy	HTE	SI	INT	FC	Voluntariness Use	Financial Cost
Self Awareness	1	.588**	.409**	.304**	.485**	.273**	.412**	.164**	.346**	0.044
Familiarity	.588**	1	.421**	.374**	.450**	.272**	.394**	.190**	.324**	0.111
Performance Expectancy	.409**	.421**	1	.386**	.408**	.314**	.291**	0.091	.343**	0.034
Effort Expectancy	.304**	.374**	.386**	1	.498**	.416**	.575**	.432**	.412**	.314**
THE	.485**	.450**	.408**	.498**	1	.567**	.554**	.457**	.507**	.288**
SI	.273**	.272**	.314**	.416**	.567**	1	.521**	.486**	.390**	.311**
INT	.412**	.394**	.291**	.575**	.554**	.521**	1	.608**	.557**	.316**
FC	.164**	.190**	0.091	.432**	.457**	.486**	.608**	1	.447**	.453**
Voluntariness Use	.346**	.324**	.343**	.412**	.507**	.390**	.557**	.447**	1	.131*
Financial Cost	0.044	0.111	0.034	.314**	.288**	.311**	.316**	.453**	.131*	1

The third category encompasses weak relationships ($0.2 > r < 0.4$) that are positive ($r > 0$) and highly significant ($p < 0.0001$). These relationships are listed in decreasing order and include the connection between INT and familiarity (0.394), SI and VU (0.390), PE and EE (0.386), EE and familiarity (0.374), SA and VU (0.346), EE and VU (0.343), VU and familiarity (0.324), INT and financial cost (0.316), SI and PE (0.314), FC and EE (0.314), SI and familiarity (0.27), FC and familiarity (0.19).

The relationship between FC and INT is positive and strong in strength, as the relationship between VU and INT, VU and HTE, HTE and EE, HTE and SA, financial cost and FC, HTE and familiarity, VU and FC, and INT and SA are positive but moderate in strength. While the relationship between INT and familiarity, SI and VU, PE and EE, EE and familiarity, SA and VU, EE and VU, VU and familiarity, INT and financial cost, SI and PE, FC and EE, SI and familiarity, FC and familiarity are positive but weak.

3.4. Regression Analysis

The results of the regression are displayed in Table 4 using regression analysis. With a p-value less than 0.05, the overall regression model has a confidence level of 99.9%.

3.4.1. Model Summary

The coefficient of determination (R^2) was the key metric for evaluating the model. This research demonstrated strong predictive accuracy and adequacy based on the R^2 values examined, as R^2 serves as an indicator of the model's predictive adequacy. It is determined by squaring the correlation coefficient between exogenous and endogenous constructs. R^2 values range from 0 to 1, with higher values indicating greater predictive accuracy as shown in Table 4a [28].

PLS-SEM is used for predictive purposes, according to authors in [28], Since there is no general rule for R2 and adjusted R2, it provides threshold values that present the criteria of R2 values based on the type of research or model complexity. According to marketing experts, R2 values fall into three categories: strong, moderate, and weak relationships, respectively, at 0.75, 0.50, and 0.25 [28, 29]. The accuracy of the prediction is shown as follow.

1) The financial cost of the e-learning technology demonstrated strong predictive accuracy, with an R^2 value of 0.369, reflecting the moderated effect of the predictor variable.
2) Effort expectancy of the e-learning technology Showed strong predictive accuracy, with an R^2 value of 0.489, reflecting the moderated effect of the predictor variable.
3) Self-awareness of the e-learning technology demonstrated strong predictive accuracy, with an R^2 value of 0.544, reflecting the moderated effect of the predictor variable.
4) Voluntariness of the use of the e-learning technology showed strong predictive accuracy, with an R^2 value of 0.576, reflecting the moderated effect of the predictor variable.
5) The social influence of the e-learning technology demonstrated strong predictive accuracy, with an R^2 value of 0.589, reflecting the moderated effect of the predictor variable.

Table 4: Regression analyses for INT as dependent variable

(a) Model summary for INT

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.608[a]	0.369	0.367	0.51185	0.369	180.12	1	308	0.000	
2	.699[b]	0.489	0.486	0.46146	0.120	71.944	1	307	0.000	
3	.737[c]	0.544	0.539	0.43672	0.055	36.768	1	306	0.000	
4	.759[d]	0.576	0.571	0.42158	0.032	23.374	1	305	0.000	
5	.768[e]	0.589	0.583	0.41561	0.013	9.823	1	304	0.002	1.933

(b) Coefficient and ANOVA (INT)

Model	Constructs	Coefficients Standardized coefficients			Collinearity Statistics		ANOVA			
		beta	t	Sig.	Tolerance	VIF	Sum of square	DF	Mean square	F
1	FC	0.608	13.424	0.000	1.000	1.000	80.693	308	0.262	180.192
2	Effort Expectancy	0.384	8.482	0.000	0.813	1.230	65.373	307	0.213	146.820
3	Self-Awareness	0.246	6.064	0.000	0.906	1.103	58.361	306	0.191	121.540
4	Voluntariness Use	0.217	4.835	0.000	0.962	1.445	54.206	305	0.178	103.664
5	Social influence	0.410	3.134	0.000	0.681	1.469	52.510	304	0.173	87.295

a. predictors: (Constant) culture: FC, effort expectancy, self-awareness, voluntariness sue, SI

3.4.2. Coefficient Analysis

Table 4b displays the results of the coefficient computation, which evaluated the impact of all direct hypotheses by looking at the regression coefficient (β), t-statistics, and p-values. Table 4b displays the relationship between ($\beta = 0.608$, $t = 13.424$, $p < 0.05$) lending support for H1 and intention to use (INT) and facilitating condition. Therefore, we can conclude that students may be more inclined to use

e-learning technology if facilitating conditions are available. This finding is consistent with that of [10], who discovered a strong and favourable correlation between the intention to use e-learning technology and the facilitating conditions. [18, 30] reported that facilitating conditions were a significant predictor of the intention to use. Facilitating conditions amongst students and lecturers is important, especially by providing training on how to use e-learning platforms and digital tools is crucial for e-learning acceptance. Training programs that enhance digital literacy and familiarize users with online learning environments reduce the perceived difficulty of using e-learning systems, thereby increasing their acceptance. This idea is supported by a study by [31], which reported that effective training programs that target both students and faculty ensure a smoother transition to e-learning and lead to higher levels of engagement and satisfaction with online learning platforms. Since the WSU is thought to have relatively few technological resources, adoption is more likely to be impacted by facilitating conditions than by other factors.

Students must therefore be aware that there is support available to aid in their learning, regardless of whether they plan to use technology or already do. There was a positive and significant relationship between effort expectancy and the facilitating condition yielding ($\beta = 0.384$, $t = 9.763$, $p < 0.05$) of H2, which states effort expectancy (EE) in particular with experienced students (those who have used the e-learning platform before) might make them more willing to use e-learning technology and encourage the new students to use the technology for their academic purpose. Previous research that views effort expectancy as a powerful and significant antecedent of the intention to use e-learning technology supports this finding [32]. Also in [33], Effort expectancy was identified as the most significant factor influencing behavioral intentions. The author affirmed that the productivity, efficiency, and effectiveness return of the technology can motivate students' attitudes toward the adoption of the technology for academic purposes. However, we propose that providing e-learning to students is futile if the technology does not contribute to their academic advancement. Managers at tertiary institutions need to invest in e-learning technology that can impact student's academics in terms of efficiency, productivity, and effectiveness, this might motivate students to use and adopt the technology.

The Department of Information Technology at WSU has to adopt the university strategy to invest in e-learning technology that can assist their students in improving their academic work with the lower cost of an internet bundle. Additionally, the department could emphasize incorporating various technologies into classroom instruction and adopt a blended learning approach for select courses. The self-awareness construct hypothesis is also a significant factor in students' intention to use e-learning technology, as Table 4b demonstrates. Effort expectancy (EE) and self-awareness (SA) have a significant and positive path

coefficient (β = 0.246, t = 6.064, p < 0.05), supporting H3. As a result, it can be concluded that students are more likely to become interested in e-learning technology when they observe its efficiency, effectiveness, and productivity. Additionally, because they lack the necessary technological skills, they are more likely to seek help on how to use the tools to improve their educational experience. Authors in [10], found a strong and positive correlation between self-awareness (SA) and effort expectancy (EE). This result is consistent with their findings.

Furthermore, self-awareness and voluntariness of use (VU) have a positive relationship (β=0.217, t = 4.835, p < 0.05) in the context of rural tertiary institutions leading to support H4. This significant and positive relationship signifies that enhancing students' self-awareness directly boosts their voluntariness to adopt e-learning platforms for academic purposes. These insights can inform strategic decision-making to improve technology acceptance and integration. Also, the relationship demonstrates that fostering self-awareness campaigns can significantly enhance students' voluntary adoption of e-learning. In rural tertiary institutions like WSU, we suggest that the institution should prioritize personalized guidance and monitoring to improve self-awareness, thus encouraging greater adoption and use of e-learning technologies.

Finally, the relationship between voluntariness of use (VU) and social influence (SI) in H5 indicated that (β =0.140, t = 3.134, p < 0.05) was achieved. This hypothesis was positive and significantly supported. The significant implication of this hypothesis is that self-awareness significantly enhances how students perceive and respond to social influence. Students who are confident in their abilities are more likely to be influenced positively by social factors such as peer support, family, and lecturers' encouragement. In rural institutions such as WSU, social influence can be leveraged by fostering peer learning groups, faculty mentorship and community-based e-learning initiatives, especially for students with high self-awareness. The ANOVA results in Table 4b reveal that the overall model, incorporating both blocks of variables, is significant with the following values: FC(F(1, 308)) = 180.192, EE(F(2, 307)) = 146.820, SA(F(3, 306)) = 121.540, VU(F(4, 305)) = 103.664, and SI(F(5, 304)) = 87.295, all with p < 0.05.

3.5. Discussion of Findings

Technology advancements have had a profound impact on teaching and learning in higher education, changing the way that education is delivered. By applying the unified theory of acceptance and use of technology (UTAUT), this study provides a thorough framework for understanding the factors influencing the adoption and use of technology in higher education institutions.

1) Facilitating Conditions (FC)

Facilitating conditions refer to the resources and support available to users, including access to technology, infrastructure, and training. Adequate facilitating conditions are essential for technology acceptance. From the regression result, FC factors (H1; coefficient (β)=0.217, t=4.835; p<0.001) are relevant factors that influence the intention to use e-learning platforms by students. This notion is supported by [34]when users perceive that the necessary resources (e.g., technical support, and access to technology) are available, their intention to use technology increases. Studies in higher education have shown that institutions providing robust technological support enable greater adoption of digital tools [35]. The effectiveness of technology in education is often contingent on the quality of facilitating conditions. Research by [36] found that institutions with strong support systems and adequate technological infrastructure positively impact student learning outcomes and satisfaction.

2) Voluntariness of Use

Voluntariness of use refers to the extent to which technology adoption is perceived as optional rather than compulsory. When technology use is voluntary, individuals are more likely to adopt it enthusiastically. From the regression result, VU factors (H10; coefficient (β) = 0.608, t = 13.424; p<0.001) are relevant factors that influence the intention to use e-learning platforms by students. This is supported by the study by[37] which found that students are more inclined to use e-learning platforms when they believe their participation is voluntary. Mandatory use can lead to resistance and dissatisfaction, while voluntary adoption often fosters a positive learning experience. Research by [38] indicated that voluntary adoption leads to greater engagement and better academic performance.

Technologies that are perceived as user-friendly encourage higher intention to use. A study by [34] found that a lower effort expectancy significantly influences technology acceptance in educational settings. Studies show that students are more likely to use learning management systems that are easy to navigate, [39]. User-friendly technologies enhance the learning experience and contribute to better academic outcomes. Research by [40] suggests that when students find educational technology easy to use, they are more likely to engage deeply with the content, leading to improved learning success.

3) Self-Awareness (SA)

Higher self-awareness can lead to increased confidence in using technology. The regression results show SA factors (H13; coefficient (β) = 0.246, t = 6.064; p<0.001) are also relevant factors that influence the intention to use e-learning

platforms by students. Research by [41] emphasizes that self-awareness influences students' intention to adopt new technologies. When students are aware of their digital skills and the advantages of using technology, they are more likely to engage with it. Also, self-awareness enhances motivation and engagement in learning. According to [42], students who possess a strong sense of self-awareness are more likely to persist in the face of challenges, resulting in better educational outcomes.

4) Financial Cost (internet bundle and load shedding)

High costs of the internet and load shedding can deter technology adoption. A study [43] found that students' intention to use e-learning platforms is negatively affected by the perceived costs of internet bundles associated with them. Institutions must consider the affordability of internet bundles to encourage technology acceptance. Research by [44] demonstrated that students who have access to cost-effective educational technologies perform better academically. Furthermore, research by [45] revealed that students in rural areas are motivated to use e-learning platforms when there is a constant electricity supply.

5) Social Influence (SI)

Social influence reflects the effect of peer and societal expectations on individuals' technology use. From the regression result, SI factors (H11; coefficient (β)=0.410, t=4.835; p< 0.001) are relevant factors that influence the intention to use e-learning platforms by students. Positive social influence can significantly enhance technology acceptance. According to [34], when peers encourage the use of technology, individuals are more likely to adopt it. A study [46] found that students are more inclined to use digital tools when they observe their peers successfully using them. A supportive social environment fosters positive attitudes towards technology, leading to higher success rates. Research by [47] indicates that social support from faculty and peers can enhance students' motivation and overall learning outcomes.

6) Potential Negative Impact of Technology Implementations

One of the most common challenges reported in studies that utilized digital tools in the classroom was the lack of students' skills on how to use them. Research in [48] found that students' lack of technical skills is a barrier to the effective use of digital technologies in the classroom. Also, [49] reported that students faced challenges when using tablets and smart mobile devices, associated with the technical issues or expertise needed for their use and the distracting nature of the devices and highlighted the need for teachers' professional development. Authors in [50] reported that skills training about the use of digital technologies is essential for learners to fully exploit the benefits of instruction.

Apart from digital competence, technical support in the school setting has also been shown to affect teachers' use of technology in their classrooms [51]. Furthermore, [52] found that while teachers' use of ICT is high, the authors stated that they needed more institutional support and a shift in the mindset of educational actors to achieve more innovative teaching practices. The provision of support can reduce time and effort as well as cognitive constraints, which could cause limited ICT integration in the school lessons by teachers [53].

4. CONCLUSION

This study offers a more comprehensive insight into related issues and a refined framework for understanding how technological advancements affect students' intentions to use technology in rural tertiary institutions. Throughout the digital transformation era, there has been a noticeable rise in the use of technology in education. In addition to many other advantages, this facility fosters teamwork and knowledge sharing. It is possible to draw some important conclusions from the study's analysis and findings. As per the findings, students' contentment with digital teaching and learning methods is influenced by their degree of self-awareness and their proficiency in using technology for education. Technology development indicators that are significant predictors of the dependent variable (the student's intention) to use the technology include effort expectancy, facilitating condition, self-awareness, voluntariness to use, and social influence (SI). Students are aware of effort expectation, facilitating conditions, self-awareness, voluntariness to use, and social influence, according to the descriptive statistics analysis.

To increase students' willingness to use technology for teaching and learning, tertiary institutions need to offer regular training and development opportunities along with technical support. The ANOVA results revealed differences in students' intentions to use technology. Additionally, there was a noteworthy correlation found between the independent and dependent variables. Self-awareness and enabling circumstances are more strongly correlated with students' intention to use technology which is the social influence. Also, a strong correlation is discovered between the tertiary institution's technical support and students' intention to use the technology.

The study's conclusions have theoretical as well as practical outcomes. The traditional unified theory of acceptance and use of technology (UTAUT) model has been theoretically expanded to include particular elements of financial cost and success in tertiary higher education, as well as specific external support factors. The adoption and use of e-learning technology for teaching and learning in rural tertiary institution contexts is examined from the viewpoint of the students using the UTAUT model. The extended technology acceptance model's explanatory power has increased to a point where it can play a major role in explaining how students

in higher education adopt and use technology for instruction and learning. By examining the contributing elements and enhanced students' academic performance and use of technology, future research may continue to examine other contexts. Through the use of structural equation modelling techniques, some additional theoretical advantages of e-learning technology in postsecondary institutions can be confirmed. This research helps rural postsecondary institutions implement the technology acceptance model. Future research can examine the research paradigm and methodologies presented in this study to look into how the set of construct variables relate to one another.

4.1. Practical Implications

This study could offer practical recommendations for students and lecturers in higher education on how to encourage the adoption of e-learning technology for educational purposes. While the advantages of e-learning are widely recognized by both students and lecturers, financial constraints, such as the cost of internet bundles, and issues like load-shedding may negatively impact students' willingness to utilize e-learning technology, particularly in rural tertiary institutions. To learn more about students' difficulties using e-learning technology for teaching and learning, researchers can carry out additional pedagogical practice studies. Students may benefit physiologically from the lecturer's upbeat demeanour when using the technology. Results point to the possibility that additional instruction could significantly increase students' adoption and use of technology. Furthermore, findings indicate that students will be more satisfied if they receive instruction from the university on how to use technology, regardless of their current awareness of its advancements in teaching and learning. Hence, this e-learning technology can have a greater effect on student performance if university administrations plan regular technology development and give their students the technical support and training, they need. Experience, effort expectancy, performance expectancy, and success rate may all be related to higher tertiary education. This could help identify the causes of students' difficulties embracing e-learning technology for their educational endeavours. Given the widespread acceptance of e-learning technology among students and lecturers, its integration into present and future teaching and learning cultures must be considered. Research indicates that lecturers should combine e-learning with other pedagogical approaches in addition to collaborative learning.

4.2. Potential Challenges of Replicating Technology

E-learning brings its unique challenges. One major obstacle is the potential for feelings of isolation and a lack of social interaction. Learners in distance learning programs may miss out on the benefits of in-person interactions and the sense of community that comes with traditional classroom settings [54]. Creating

opportunities for virtual collaboration and fostering a sense of belonging among learners becomes crucial to overcoming this challenge. Additionally, e-learning may require learners to have reliable access to technology and internet connectivity. Those without adequate resources or living in remote areas may face barriers in accessing online materials and participating fully in distance learning programs [55]. Institutions and educators need to address these challenges by providing support and resources to learners, implementing effective online teaching strategies, offering technical assistance, and promoting a sense of community and engagement among learners. Continuous efforts to bridge the digital divide and ensure equal access to online education can also help overcome the challenges associated with e-learning [49]. Another challenge that can arise in e-learning is the potential for a lack of immediate feedback and personalized support. In a traditional classroom setting, learners can directly interact with instructors, ask questions, and receive instant feedback. Lastly, ensuring the quality and credibility of e-learning content can be a challenge. With the abundance of online resources and information, learners may encounter misleading or unreliable content [56].

4.3. Recommendations

Based on the findings, we recommended that faculty should implement training programs on digital tools, improve IT infrastructure, and develop policies that support the adoption of e-learning technologies. E-learning technology's impact on managers and lecturers is not considered by the research framework. A survey of other South African universities located in both urban and rural areas could produce more in-depth results regarding the use of e-learning technology for teaching and learning, as this study only looked at one university in a rural area. More information will be needed in the future to compare the variables from various academic institutions inside South Africa's borders. Furthermore, there is a need for comparative studies across various institutions. Examine the long-term impacts of e-learning technology adoption to understand sustainability and behavioral changes over time. Incorporate cultural dimensions into the UTAUT model to better reflect local attitudes and behaviors.

AUTHOR STATEMENT

The authors declare that there is no conflict of interest.

REFERENCES

[1] L. K. Kalyani, "The Role of Technology in Education: Enhancing Learning Outcomes and 21st Century Skills," *Int. J. Sci. Res. Mod. Sci. Technol.*, vol. 3, no. 4, pp. 5–10, 2024, doi: 10.59828/ijsrmst.v3i4.199.

[2] S. Marshall, L. Blaj-Ward, N. Dreamson, J. Nyanjom, and M. T. Bertuol, "The Reshaping of Higher Education: Technological Impacts, Pedagogical Change, and Future Projections," *High. Educ. Res. Dev.*, vol. 43, no. 3, pp. 521–541, 2024, doi: 10.1080/07294360.2024.2329393.

[3] A. Haleem, M. Javaid, M. A. Qadri, and R. Suman, "Understanding the Role of Digital Technologies in Education: A Review," *Sustain. Oper. Comput.*, vol. 3, pp. 275–285, 2022.

[4] O. A. A. B. T. Gamede and O. S. Afolabi, "Exploring the Adoption and Usage of Learning Management System as an Alternative for Curriculum Delivery in South African Higher Education Institutions During COVID-19 Lockdown," *Int. J. High. Educ.*, vol. 11, no. 1, pp. 71–84, 2021, doi: 10.5430/ijhe.v11n1p71.

[5] C. C. Chigozie-Okwum, P. C. Ezeanyeji, and J. N. Odii, "Adoption of Learning Management Systems in Nigerian Tertiary Institutions: Issues and Challenges," *Int. J. Comput. Appl.*, vol. 181, no. 30, pp. 975–8887, 2018, doi: 10.5120/ijca2018918173.

[6] S. Mhlongo, K. Mbatha, B. Ramatsetse, and R. Dlamini, "Challenges, Opportunities, and Prospects of Adopting and Using Smart Digital Technologies in Learning Environments: An Iterative Review," *Heliyon*, vol. 9, no. 6, p. e16348, 2023.

[7] B. I. Omodan, "Deconstructing the Challenges of COVID-19 on First-Year Rural University Students in South Africa," *Afr. J. Inter/Multidiscip. Stud.*, vol. 3, no. 1, 2021.

[8] R. E. Sewandono, A. Thoyib, D. Hadiwidjojo, and A. Rofq, "Performance Expectancy of E-Learning on Higher Institutions of Education Under Uncertain Conditions: Indonesia Context," *Educ. Inf. Technol.*, vol. 28, pp. 4041–4068, 2023, doi: 10.1007/s10639-022-11074-9.

[9] I. Y. Alyoussef, "Acceptance of E-Learning in Higher Education: The Role of Task-Technology Fit with the Information Systems Success Model," *Heliyon*, vol. 9, no. 3, p. e13751, 2023.

[10] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Q.*, vol. 36, no. 1, pp. 157–178, 2012.

[11] S. Ahmad, A. S. M. Noor, A. A. Alwan, Y. Gulzar, W. Z. Khan, and F. A. Reegu, "eLearning Acceptance and Adoption Challenges in Higher Education," *Sustainability*, vol. 15, no. 7, p. 6190, 2023, doi: 10.3390/su15076190.

[12] H. Khechine, P. Ndjambou, and S. Lakhali, "A Meta-Analysis of the UTAUT Model: 11 Years Later," *Can. J. Adm. Sci.*, vol. 33, no. 2, pp. 138–152, 2016.

[13] I. Kakepoto, I. A. Memon, I. A. Halepoto, Q. Talpur, and K. B. Jalbani, "Exploring E-Learning Barriers of University Students During COVID-19 Pandemic," *Int. J. Innov. Creat. Change*, vol. 15, no. 6, pp. 1161–1174, 2021.

[14] J. N. Jere, "Investigating University Academics' Behavioural Intention in the Adoption of E-Learning in a Time of COVID-19," *S. Afr. J. Inf. Manage.*, vol. 22, no. 1, p. a1280, 2020, doi: 10.4102/sajim.v22i1.1280.

[15] M. M. McIntyre, P. S. Medina, J. Zhang, and A. Ni, "Understanding Student Intentions to Take Online Courses: A Theory-Driven Examination of Adoption Factors and Prior Experience," *Educ. Inf. Technol.*, vol. 28, pp. 15599–15624, 2023, doi: 10.1007/s10639-023-11823-4.

[16] A. Z. A. Rawashdeh, E. Y. Mohammed, A. R. A. Arab, M. Alara, and B. Al-Rawashdeh, "Advantages and Disadvantages of Using E-Learning in University Education: Analyzing Students' Perspectives," *Electron. J. E-Learn.*, vol. 19, no. 2, pp. 107–117, 2021.

[17] G. Payne and J. Payne, *Key Concepts in Social Research*, SAGE Publications, 2004, doi: 10.4135/9781849209397.

[18] V. Venkatesh, X. Zhang, and T. A. Sykes, "Doctors Do Too Little Technology: A Longitudinal Field Study of an Electronic Healthcare System," *J. Inf. Syst. Res.*, vol. 22, no. 3, pp. 319–339, 2011.

[19] H. Pamugar, W. W. Winarno, and W. Najib, "Model Evaluasi Kesuksesan dan Penerimaan Sistem Informasi E-Learning pada Lembaga Diklat Pemerintah," *Sci. J. Inf.*, vol. 1, no. 1, pp. 13–27, 2014, doi: 10.15294/sji.v1i1.3638.

[20] M. Kocaleva, I. Stojanovic, and Z. Zdravev, "Model of E-Learning Acceptance and Use for Teaching Staff in Higher Education Institutions," *Int. J. Mod. Educ. Comput. Sci.*, vol. 7, no. 4, pp. 23–31, 2015.

[21] M. S. Kocaleva, I. Stojanovic, and Z. Zdravev, "Model of E-Learning Acceptance and Use for Teaching Staff in Higher Education Institutions," *Int. J. Mod. Educ. Comput. Sci.*, no. 7, pp. 23–31, 2015, doi: 10.5815/ijmecs.2015.04.03.

[22] D. S. Haris and Elvina, "Analysis of Factors Affecting User Acceptance of the Implementation of Classcraft E-Learning: Case Study Faculty of Information Technology of Tarumanagara University," in *Proc. Int. Conf. Adv. Comput. Sci. Inf. Syst.*, 2015, pp. 73–78, doi: 10.1109/ICACSIS.2015.7415161.

[23] O. J. Osahon and O. Kingsley, "Statistical Approach to the Link Between Internal Service Quality and Employee Job Satisfaction: A Case Study," *Am. J. Appl. Math. Stat.*, vol. 4, no. 6, pp. 178–184, 2016, doi: 10.12691/ajams-4-6-3.

[24] R. A. Peterson, "A Meta-Analysis of Cronbach's Coefficient Alpha," *J. Consum. Res.*, vol. 21, pp. 381–391, 1994.

[25] I. Willems, V. Verbestel, P. Calders, B. Lapauw, and M. D. Craemer, "Test-Retest Reliability and Internal Consistency of a Newly Developed Questionnaire to Assess Explanatory Variables of 24-H Movement Behaviors in Adults," *Int. J. Environ. Public Health*, vol. 1, no. 20, p. 4407, 2023, doi: 10.3390/ijerph20054407.

[26] H. Khechine, P. Ndjambou, and S. Lakhali, "A Meta-Analysis of the UTAUT Model: 11 Years Later," *Can. J. Adm. Sci.*, vol. 33, no. 2, pp. 138–152, 2016.
[27] P. G. Jupp, "The Ecology of West Nile Virus in South Africa and the Occurrence of Outbreaks in Humans," 2006.
[28] J. F. Hair, C. M. Ringle, and M. Sarstedt, "Partial Least Squares Structural Equation Modelling: Rigorous Applications, Better Results and Higher Acceptance," *Long Range Plann.*, vol. 46, pp. 1–12, 2013.
[29] M. Sarstedt, C. M. Ringle, D. Smith, R. Reams, and J. F. Hair, "Partial Least Squares Structural Equation Modelling (PLS-SEM): A Useful Tool for Family Business Researchers," *J. Fam. Bus. Strategy*, vol. 5, pp. 105–115, 2014.
[30] Y. S. Foon and B. C. Y. Fah, "Internet Banking Adoption in Kuala Lumpur: An Application of UTAUT Model," *Int. J. Bus. Manage.*, vol. 6, no. 4, pp. 161–167, 2011.
[31] T. Bates and A. Sangra, "Managing Technology in Higher Education: Strategies for Transforming Teaching and Learning," John Wiley & Sons, 2011.
[32] K. S. Devi, V. V. Lakshmi, and M. Aparna, "Moodle – An Effective Learning Management System for 21st Century Learners," *Alochana Chakra J.*, vol. IX, no. VI, 2020.
[33] N. Kumar et al., "Educational Technology and Libraries Supporting Online Learning," *IGI Glob.*, pp. 209–237, 2024, doi: 10.4018/979-8-3693-2782-1.ch012.
[34] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User Acceptance of Information: Towards A Unified View," *MIS Q.*, vol. 27, no. 3, pp. 425–478, 2003, doi: 10.2307/30036540.
[35] S. Alharbi and S. Drew, "Factors Affecting the Adoption of E-learning in Saudi Arabian Universities," *Comput. Human Behav.*, vol. 30, pp. 111–117, 2014.
[36] W. Bhuasiri, O. Xaymoungkhoun, H. Zo, and J. J. Rho, "Critical Success Factors for E-Learning in Developing Countries: A Comparative Study Between Laos and Thailand," *Int. Rev. Res. Open Distrib. Learn.*, vol. 13, no. 3, pp. 162–184, 2012.
[37] J. Ahn, M. Chang, and J. Lee, "A Study on the Factors Affecting the Intention to Use E-Learning Systems in Higher Education," *Educ. Technol. Res. Dev.*, vol. 55, no. 3, pp. 241–263, 2007.
[38] V. Venkatesh and F. D. Davis, "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," *Manag. Sci.*, vol. 46, no. 2, pp. 186–204, 2000.
[39] C. Wang, Y. Wang, and C. Wang, "An Investigation of the Acceptance of Blended Learning in Higher Education: A Case Study in Taiwan," *Educ. Technol. Soc.*, vol. 17, no. 4, pp. 12–22, 2014.

[40] L. Ma and J. Liu, "The Effects of Perceived Ease of Use and Self-Efficacy on Students' Behavioural Intention to Use Blended Learning," *Comput. Human Behav.*, vol. 108, no. 106320, 2020.
[41] P. Tiwari, N. Singh, and A. Shukla, "Self-Efficacy and Technology Acceptance Model: A Study on Higher Education Students," *Educ. Inf. Technol.*, vol. 25, no. 4, pp. 2871–2893, 2020.
[42] A. Bandura, "Self-Efficacy: The Exercise of Control," W. H. Freeman and Company, 1997.
[43] P. Hsieh and H. Wu, "Exploring Students' Intention to Use Web 2.0 Technologies: A Study of the Factors Influencing the Adoption of Web 2.0 Technologies," *Comput. Educ.*, vol. 57, no. 2, pp. 1696–1704, 2011.
[44] S. Beekman, A. V. d. Linde, and M. Rossouw, "The Impact of Financial Barriers on Student Engagement in Higher Education," *Stud. High. Educ.*, vol. 47, no. 8, pp. 1647–1660, 2022.
[45] C. Mbaleki, F. A. Elegbeleye, O. A. Esan, and T. Rabotapi, "Power Supply Rationing in an Era of E-Learning: Evidence from the Rural University," *Eureka: Soc. Humanit.*, vol. 6, pp. 3–12, 2023.
[46] M. I. Hossain and A. Shukla, "The Influence of Social Norms on the Use of Educational Technologies," *J. Educ. Comput. Res.*, vol. 57, no. 7, pp. 1741–1765, 2019.
[47] Y. Wang, Y. Wang, and W. Chen, "The Role of Social Support in the Acceptance of Mobile Learning," *J. Educ. Technol. Soc.*, vol. 19, no. 1, pp. 173–183, 2016.
[48] J. S. Fu, "ICT in Education: A Critical Literature Review and Its Implications," *Int. J. Educ. Dev. Using Inf. Commun. Technol.*, vol. 9, no. 1, pp. 112–125, 2013.
[49] J. L. Moore, C. Dickson-Deane, and K. Galyen, "E-Learning, Online Learning, and Distance Learning Environments: Are They the Same?," *Internet High. Educ.*, vol. 14, no. 2, pp. 129–135, 2011, doi: 10.1016/j.iheduc.2010.10.001.
[50] S. Higgins, Z. Xiao, and M. Katsipataki, "The Impact of Digital Technology on Learning: A Summary for the Education Endowment Foundation," *Educ. Endow. Found. Durham Univ.*, 2015.
[51] A. Delgado, L. Wardlow, K. O'Malley, and K. McKnight, "Educational Technology: A Review of the Integration, Resources, and Effectiveness of Technology in K-12 Classrooms," *J. Inf. Technol. Educ. Res.*, vol. 14, no. 397, 2015.
[52] A. Ferrari, R. Cachia, and Y. Punie, "Educational Change Through Technology: A Challenge for Obligatory Schooling in Europe," *Lect. Notes Comput. Sci.*, vol. 6964, pp. 97–110, 2011.
[53] M. Escueta, V. Quan, A. J. Nickow, and P. Oreopoulos, "Education Technology: An Evidence-Based Review," 2017.

[54] F. Mızrak and M. Culduz, "Determining and Evaluating Criteria for Transformational Leadership in Educational Institutions With AHP Method," in *Transformational Leadership Styles for Global Leaders: Management and Communication Strategies*, pp. 56–77, 2023, doi: 10.4018/979-8-3693-1380-0.ch004.

[55] M. Mahyoob, "Challenges of E-Learning During the COVID-19 Pandemic Experienced by EFL Learners," *Arab World Engl. J.*, vol. 11, no. 4, 2020.

[56] S. Palvia et al., "Online Education: Worldwide Status, Challenges, Trends, and Implications," *J. Glob. Inf. Technol. Manage.*, vol. 21, no. 4, pp. 233–241, 2018, doi: 10.1080/1097198X.2018.1542262.