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Tangible Resources and Effective E-Learning Implementation in Selected Ugandan Public Universities

Wilson Mugizi[1], Joseph Rwothumio[2]

[1, 2] Kyambogo University

Abstract
This study assessed the influence of tangible resources on the effective implementation of e-learning during and beyond the COVID-19 pandemic era in public universities in Uganda. The concept of tangible resources was derived from the Resource-Based View Theory. Universities' tangible resources for e-learning were operationalized in terms of ICT teaching facilities, access to ICT facilities, e-library resources, and university ICT implementation policies. Using a cross-sectional survey design, data were collected from a sample of 312 academic staff using a questionnaire survey. The data were analysed using descriptive statistics and structural equation modelling (SEM). The findings revealed that access to ICT facilities and university ICT policy positively and significantly predicted e-learning implementation. However, ICT teaching facilities and library e-resources positively but insignificantly predicted e-learning implementation. The conclusions of the study were to the effect that access to ICT facilities and universities' ICT policies are imperative for the implementation of e-learning. Nevertheless, ICT teaching facilities and libraries' e-resources do not necessarily lead to the effective implementation of e-learning. The study recommended that university managers make efforts to ensure that ICT facilities are accessible to lecturers and students and develop policies guiding the implementation of e-learning. University managers should also make university ICT resources and library e-resources more accessible to lecturers and students.

Keywords: Access, E-Library, Facilities, ICT, Implementation, Policies, RBVT, Resources, Tangibles, Teaching

1. Introduction

Fundamentally, the education landscape globally has changed since the outbreak of the COVID-19 pandemic because of intermittent closures of educational institutions that denied teachers and students on campus face-to-face teaching and learning. Since then, it has become necessary for universities to include the online teaching mode using e-teaching and learning (Bozkurt et al., 2020; Godber & Atkins, 2021). Already, most educational institutions in the Western World and Asia had largely advanced in the adoption of e-learning. Nevertheless, in the developing countries of Africa, very few educational institutions were ready to use online teaching and learning to satisfactory levels (Maré & Mutezo, 2021; Mugizi & Nagasha, 2023). Taking the example of Uganda, a handful of private universities before the COVID-19 pandemic had effective pre-existing e-learning platforms successfully offering online education (Kabahizi, 2020). While almost all the top public universities in the country offering in-service and external programmes already had open distance education learning

programmes for students on those programmes, they hardly conducted remarkable online classes (Busein, 2021). In those universities, the online teaching and learning platforms existed, but few students were using them; they had limited content, were very slow, and even could not accommodate a large number of users at a single time (Shabomwe, 2021).

In Uganda, during the initial closure of educational institutions that started in March 2020 (Mugizi et al., 2021), universities that attempted to conduct online teaching and learning were blocked by the government, claiming that by closing educational institutions, it meant that every educational activity was supposed to shut down, including the running of any online activity (Ahabwe, 2020; Muhwezi, 2020). Challenges cited for blocking online classes included unaffordable internet costs for teachers and students, poor internet connectivity, a lack of ICT tools, and low knowledge of ICT use (Komuhangi et al., 2022). Nonetheless, after three months of lockdown in educational institutions, the Government realised that COVID-19 was not about to go away. Hence, the government asked universities to start online classes. The reality of the "new normal" situation dictated that educational institutions adopt online teaching and learning. Higher institutions of education were required to conduct long-distance modes of instruction using whatever technologies they could harness (Kabahizi, 2020).

While the government realised the need for online classes, implementation became problematic. At Makerere University, a section of students staged a protest against online classes, claiming that the system was ineffective and was being forced on them by the university administration (Busein, 2021). At Kyambogo University, students protested against online learning, complaining that most lecturers were not involved in online classes (Shabomwe, 2021). This was despite the fact that Makerere University already had an online learning platform, the "Makerere University E-learning Environment" (MUELE), on which lecturers could upload learning content and engage students in interactive activities including discussion forums, assignments, and quizzes, among others (Olum et al., 2020). Similarly, Kyambogo University already had in place an Open Distance Education Learning (ODEL) Centre equipped to offer e-learning to in-service and external students. In addition, the universities already had computer laboratories, internet connectivity, and e-library resources that could facilitate e-teaching and learning (Mugizi & Nagasha, 2023). With these tangible resources in place, the unanswered empirical question that emerged was how existing university e-learning resources could contribute to effective e-learning implementation.

The above unanswered empirical question emerged because it was assumed that, based on existing tangible resources, universities could have effectively implemented e-learning. The concept of tangible resources is anchored in resource-based theory. The Resource-Based Theory (RBT), introduced by Penrose (1959) and developed by its proponents such as Barney (1986), explains that among the essential resources of organisations are tangible resources. Tangible resources are specific assets of a tangible nature that an institution owns and uses to perform its activities. Tangible resources are necessary within the context in which institutions perform their activities and are relevant factors in generating routines (Torres-Barreto et al., 2020). Tangible resources are vital for the operations of organisations. A minimum amount of tangible resources is a requirement for successful organisational performance (Wongwilai et al., 2022). Tangible resources provide a sustainable competitive advantage to organisations (Holdford, 2018). Tangible resources are utilised to provide services (Jawed & Siddiqui, 2019) and help organisations overcome and deal with uncertainties, enhancing organisational success (Kim et al., 2019). Studies reveal that tangible resources for e-learning include ICT teaching facilities (Akbulut et al., 2007), access to ICT facilities (Akbulut et al., 2007; Mugizi & Amwine, 2020), and ICT implementation policies (Akbulut et al., 2007; Isaacs et al., 2018; Anyim, 2018). This study assessed the influence of tangible resources on the effective implementation of e-learning during and beyond the COVID-19 pandemic era in public universities in Uganda. Specifically, the study tested the hypotheses to the effect that;

H1: ICT facilities have a significant influence on effective e-learning implementation.

H2: Access to ICT facilities has a significant influence on effective e-learning implementation.

H3: Library e-resources have a significant influence on effective e-learning implementation.

H4: Universities ICT policies have a significant influence on effective e-learning implementation.

2. Tangible Resources and Implementation of E-learning

Tangible resources for e-learning include ICT teaching facilities, access to ICT facilities, and ICT implementation policies. With respect to ICT teaching facilities, these include computers, the internet, an intranet, video conferencing, and broadcasting technologies, among others, that can facilitate instruction and the teaching and learning processes (Basak et al., 2018). ICT is an important tool for realising a new paradigm of learner-centred education due to the range of ICT options for videoconferencing and websites that can be used to meet the challenges teachers face. ICT provides more flexible and effective ways for lifelong learning for today's teachers and students (Hailye, 2020). Scholars (e.g., Akinde & Adetimirin, 2017; Asubiojo & Ajayi, 2017; Eze et al., 2018; Gupta et al., 2022; Hailye, 2020; Matviichuk et al., 2022; Ouma, 2021; Semlambo et al., 2022) have related ICT teaching facilities and e-learning implementations. The studies above revealed that ICT teaching facilities are important in the implementation of e-learning. However, while the studies pointed to the importance of ICT facilities in the implementation of e-learning, the study done at a private university in Uganda by Ouma indicated that there were limited ICT facilities. This attracted the need for this study in the context of public universities to explore whether the situation was different and how what prevailed related to effective e-learning implementation..

With respect to ICT facility access, this is an individual's unhindered right or ability to locate and use ICT technology devices (Umukoro et al., 2021). Access to ICT resources affects e-learning implementation because e-learning thrives on the availability of ICT facilities (Adarkwah, 2021). Students who have a higher level of access to digital devices such as computers, smartphones, tablets, and the Internet are likely to respond positively to e-learning delivery (Arthur-Nyarko & Kariuki, 2019). Studies (Arthur-Nyarko & Kariuki, 2019; Adarkwah, 2021; Innab & Alqahtani, 2022; Lembani et al., 2019; Newen & Cheny, 2022; Siddiquah & Salim, 2017; Subashini et al., 2022; Yuliani & Mercuriani, 2021) have been carried out on access to ICT facilities and e-learning implementation. However, the studies revealed empirical gaps. For instance, while Adarkwah (2021) and Lembani et al. (2019) indicated that lack of access to ICT facilities hindered implementation of e-learning, Arthur-Nyarko and Kariuki (2019) indicated that access to internet access did not influence preference for e-learning delivery mode, and Siddiquah and Salim (2017) reported that students' access to ICT was not related to their use in learning. This meant that the relationship between ICT and e-learning implementation was still shrouded in contradictions, calling for the need for this study.

Regarding the ICT policies, these are statements focused on making ICT a teaching and learning tool for e-learning (Aidoo et al., 2022). Therefore, an ICT policy refers to a statement stipulating practises that guide how ICT should be implemented in an institution. There are a number of scholars (Czerniewicz & Brown, 2009; De Freitas & Oliver, 2005; MacKeogh & Fox, 2009; Priatna et al., 2020; Teo et al., 2020) that have related ICT policy to e-learning implementation. Analyses by these scholars revealed that policies enhanced e-learning implementation. Nonetheless, while the studies above suggested that scholars had expended effort to relate ICT policies to e-learning implementation, a literature search revealed a lack of such studies in the context of Uganda. This thus attracted the attention of this empirical study in the context of Uganda, to establish if universities have developed ICT policies and how they relate to e-learning implementation.

With regard to library e-resources, these are electronic information resources accessed on the web, on campus, or off campus through the library (Ternenge & Kashimana, 2019). Library e-resources include such resources as e-journals, e-books, and online databases accessed directly or remotely (Saklani, 2020). Library e-resources help faculty members and learners collect current teaching and research materials easily (Mwantimwa, 2017). Library e-resources also help learners access reading materials (Rivo & Umer, 2022). Scholars (Ajegbomogun et al., 2017; Anyim, 2021; Oladele & Modebelu, 2021; Mugizi & Amwine, 2020; Odili et al., 2020; Olaniran et al., 2017). Nevertheless, while all the studies suggested that library e-resources are essential for the implementation of e-learning, Olaniran et al. (2017) did not. This suggested that the effect of e-library resources on e-learning implementation still needed to be explored in different contexts. In addition, none of the studies captured university contexts in Uganda where students were resisting e-learning. Therefore, it was imperative to further assess the relationship between library e-resources and the implementation of e-learning.

3. Methodology

This section presents the methodology that was followed in carrying out the investigations for the study. The methods enabled the collection and analysis of data on tangible resources and effective e-learning implementation.

3.1 Research design and Sample

The cross-sectional research design guided data collection. This was because cross-sectional studies collect data on what exists at a particular point. The design enabled simultaneous analysis of a number of variables and the assessment of the study problem, leading to suggestions on how to optimise existing tangible resources for effective e-learning implementation. Since the design also enables the collection of data using a self-administered questionnaire, it was very appropriate. Full-time academic staff at the universities of Kyambogo and Makerere provided the data. A sample of 312 academic staff from a population of 1883 was studied. The respondents were drawn from a target population of 1432 academic staff from Makerere University and 451 from Kyambogo University.

3.2 Measures of the Variables

The data collection tool was a self-administered questionnaire because it enabled collecting data from a large number of respondents. The independent variables of tangible resources were measured in terms of ICT teaching facilities (Akbulut et al., 2007; Schreurs, 2007), access to ICT (Akbulut et al., 2007; Mugizi & Amwine, 2020), university ICT implementation policy (Akbulut et al., 2007; Ngololo et al., 2012; Isaacs et al., 2018), and library e-resources (Anyim, 2018). E-learning effective implementation was measured in terms of student-student, student-teacher, and student-content e-interaction (Downer et al., 2015; Malinovski et al., 2012; Ylmaz & Karataş, 2018). The ordinal scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Not sure, 4 = agree, and 5 = strongly agree, was used. This was because the anchors enabled the collection of data that could be analysed quantitatively.

3.3 Data Analysis Methods

Descriptive and inferential analyses were carried out. Descriptive analysis included the calculation of means to establish how the respondents rated the quality of tangible resources at the universities and the effectiveness of e-learning implementation. Inferential analysis involved structural equation modelling (SEM) using SmartPLS software provided in SPSS. This helped in building models of the appropriateness of the measures and establishing how tangible resources at universities enhance the implementation of e-learning.

4. Results

This section presents findings on tangible resources and effective e-learning implementation in selected Ugandan public universities. The findings include measurement and structural equation models and Path Model estimates.

4.1 Demographic Characteristics

The demographic data characteristics revealed that the modal percentage (70.8%) was male, while the females were 29.2%. The majority percentage (68.3%) of the academic staff was 40 years and older, with those 30 to 40 years being 26.0% and the remaining 5.7% being up to 30 years. The larger percentage (55.8%) of academic staff possessed master's degrees; 40.4% had PhDs; and 1.9% and another 1.9% possessed bachelor's degrees and postgraduate diplomas, respectively. The results further showed that the larger percentage (50.0%) of the respondents were at the rank of assistant lecturer, 38.5% were at the rank of lecturer, 9.6% at the rank of senior lecturer, and 1.9% at the rank of associate professor. This data shows that varied academic staff provided data. Therefore, results representative of the views of different segments of academic staff at the universities were captured.

4.2 Measurement Models

Descriptive results, specifically the means, were calculated to show how the academic staff rated the tangible resources of the universities. Thereafter, measurement models were done to establish whether the data were fit for structural equation modelling. Measurement models included validity tests in terms of Average Variance Extracted (AVE) and heterotrait-monotrait (HTMT) assessments and reliability tests in terms of Cronbach's alpha [α] and Composite Reliability [CR]. The value inflation factor (VIF) was computed to detect the existence or non-existence of linearity or correlation between the independent variables and determine whether they were appropriate for structural equation modelling. The results follow in Tables 1 and 2.

4.2.1 Measurement Model 1

The first measurement model presents descriptive statistics, specifically the means, AVE, and Heterotrait Monotrait (HTMT) Discriminant Validity. The means show how the respondents rated e-learning implementation, while the AVE and Heterotrait Monotrait (HTMT) ratios of correlations for discriminant validity show whether the measures of the variable of universities tangible resources were convergent but differently measured the variable. The results are presented in Table 1.

Table 1: Descriptives, Means and Heterotrait-Monotrait Ratio (HTMT) for Tangible Resources

Measures	Means	AVE	ELI	SCI	SSI	STI	
ELI	3.55	1.000					
SCI	3.42	0.692	0.869				
SSI	3.54	0.550	0.758	0.502			
SSI	3.68	0.526	0.869	0.640	0.517		
Measures	Means	AVE	ACT	ITF	LE	TR	UIP
ACT	2.76	0.669					
ITF	2.38	0.631	0.679				
LE	3.53	0.537	0.394	0.500			
TR	3.03	1.000	0.812	0.872	0.794		
UIP	3.10	0.594	0.678	0.626	0.506	0.883	

ACT = Access to ICT facilities, ELI = E-learning Implementation, ITF = ICT Teaching Facilities, LE = Libraries E-resources, R = Tangible Resources, SCI = Student-Content E-Interaction, SSI = Student-Student E-Interaction, STI = Student-Teacher E-Interaction, UIP = University ICT Policy.

The results in Table 1 show that overall, the lecturers rated e-learning implementation as high (mean = 3.55). This is because the mean was close to code 4, which on the five-point Likert scale used corresponded to "agree"

or high. However, the lecturers rated student-content e-interaction when using e-learning to be moderate (mean = 3.42) because the mean was close to code three for "not sure." Three being the average, the results were thus moderate or fair. With respect to student-student e-interaction (mean = 3.54) and student-teacher e-interaction (mean = 3.68), they were rated high, respectively. Therefore, while student-content e-interaction was moderate, student-student and student-teacher e-interaction was high. With respect to the independent variable of tangible resources, overall, the lecturers rated them moderate (mean = 3.03). This is because the mean was close to code 3, which on the five-point Likert scale used corresponded to "not sure" that it was fair or moderate. The lecturers rated access to ICT facilities (2.76), ICT teaching facilities (2.38), and university ICT policy (mean = 3.10) as moderate. However, library e-resources (Mean = 3.53) were rated highly. Therefore, except for e-library resources, all the other aspects of tangible resources, namely ICT facilities, ICT teaching facilities, and university ICT policy, were rated moderate.

The AVE results in Table 1 assessing convergent validity revealed that the various constructs measuring e-learning and tangible resources were appropriate measures. The AVE values are above the minimum level of 0.5. This implies that the indicators are appropriate measures of the constructs (Shrestha, 2021). Convergent validity is the degree of the relationship between measures of a latent variable. Convergent validity is a measure that proposes that measures of variables should be related to each other; hence they measure the same concept (Sürücü & Maslakç, 2020). Table 1 also shows that Heterotrait-Monotrait (HTMT) ratios of correlation that assess discriminant validity were calculated. These sought to determine whether the constructs studied were independent; hence, they described the variables of e-learning implementation and tangible resources independently. HTMT is a reflective test that determines whether measures of a variable in a model are independent and, therefore, whether their indicators strictly define each construct (Hair Jr. et al., 2020). The Heterotrait-Monotrait ratio (HTMT) correlations for three constructs of e-learning and implementation and four constructs of tangible resources (Table 1) fulfilled the discriminant validity conditions since all the values were below the maximum level of 0.90 (Hair Jr. et al., 2021). Therefore, the measures separately described the variables. This means that the data collected on the variables was appropriate for structural modelling.

4.2.2 Measurement Model 2

The second measurement model provides reliability (Cronbach's alpha [α] and composite reliability [CR]) and collinearity [VIF]) assessments. Reliability and collinearity tests were done to find out whether the data collected for the different constructs could be subjected to structural modelling. The results are indicated in Table 2.

Table 2: Construct Reliability and Validity for E-learning Implementation and Tangible Resources

Measures	α	CR	VIF
E-learning Implementation	1.000	1.000	
Student-Content E-Interaction	0.850	0.899	1.508
Student-Student E-Interaction	0.792	0.858	1.293
Student-Teacher E-Interaction	0.819	0.869	1.522
Access to ICT facilities	0.833	0.890	1.703
ICT Teaching Facilities	0.801	0.872	1.742
Libraries E-resources	0.876	0.902	1.393
University ICT Policy	0.862	0.897	1.784
Tangible Resources	1.000	1.000	

Table 2 suggests that reliability test results in terms of Cronbach's alpha (α) and composite reliability (CR) were above the threshold of 0.70, which implied that the measures of the constructs were reliable. Composite reliability was carried out since Cronbach's alpha is very sensitive because it assumes that the traits of the indicators should be the same across the population, which lowers reliability values. For composite reliability, it is liberal because it accommodates outer traits, which helps to ensure that a higher number of indicators become reliable (Hair et al., 2019). The test results in Table 2 also showed that there was no linearity (high correlation) between the variables because the values for variance inflation factor (VIF), the standard metric for measuring linearity, were less than 5 (Marcoulides & Raykov, 2019). This implied that the tangible resource variables could predict effective e-learning implementation independently.

4.3 Structural equation model for Tangible Resources and E-learning Implementation

To establish the relationship between tangible resources and e-learning implementation, a structural equation model was used. Figure 1 presents the structural equation model findings for tangible resources and e-learning implementation.

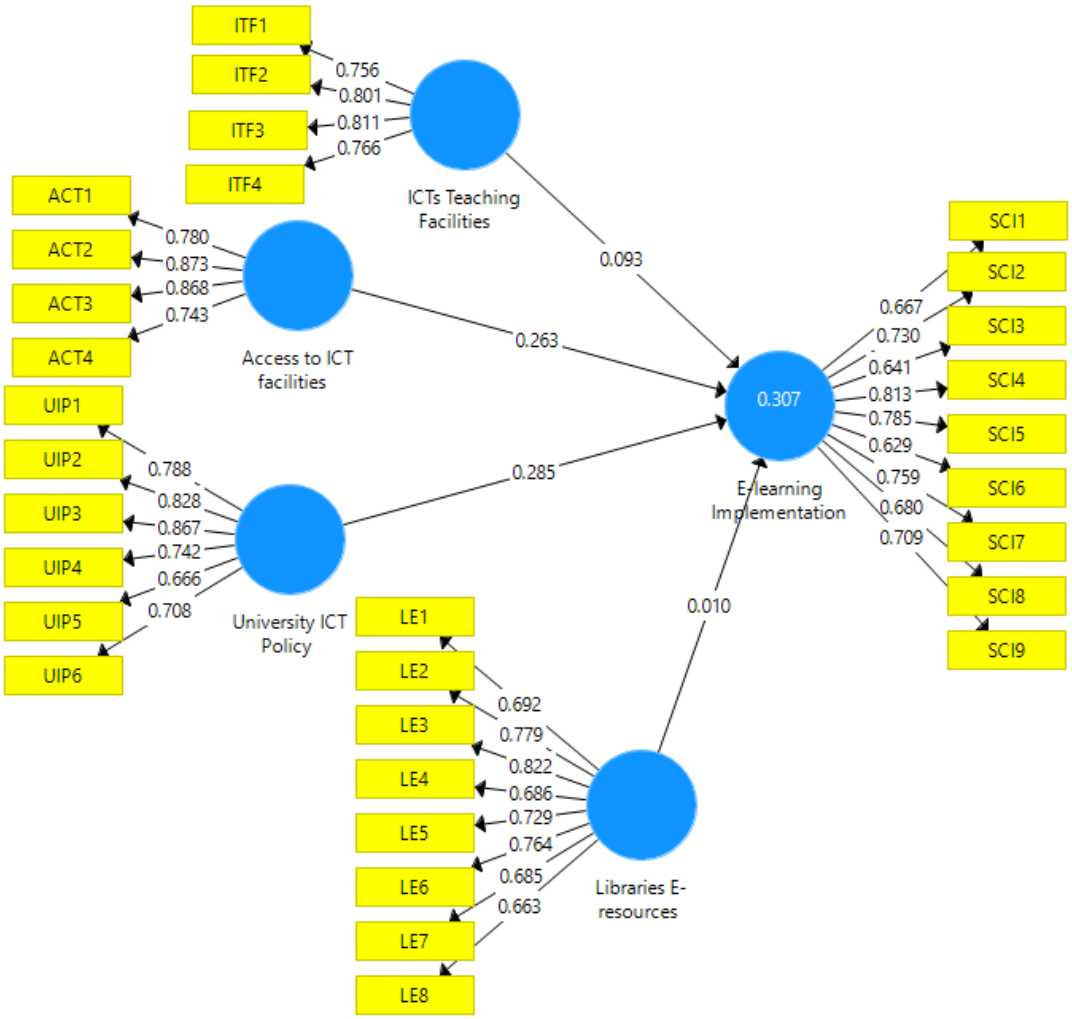

Figure 1: Structural Equation Model findings for Tangible Resources and E-Learning Implementation

Model 1 reveals that e-learning implementation was reduced only to student-content E-Interaction. This means that the remaining constructs, namely student-student and student-teacher, did not load into the model. The model comprises path coefficients between constructs, coefficients of determination (R^2 and adjusted *R2)*, and related t statistics and p-values. R^2 examined the model's predictive power. The model involved testing four sub-hypotheses under the main hypothesis (H1) to the effect that tangible resources have a significant relationship with the implementation of e-learning. The sub-hypotheses were to the effect that ICT facilities, access to ICT facilities, library e-resources, and university ICT policy relate to e-learning implementation. Table 3 presents structural equation model estimates.

Table 3: Structural equation model estimates for Tangible Resources and E-learning Implementation

Path Coefficients	B	Mean	STD	T	P
Access to ICT facilities → E-learning Implementation	0.263	0.257	0.064	4.133	0.000
ICT Teaching Facilities → E-learning Implementation	0.093	0.103	0.053	1.745	0.082
Libraries E-resources → E-learning Implementation	0.010	0.020	0.070	0.146	0.884
University ICT Policy → E-learning Implementation	0.285	0.288	0.075	3.819	0.000
$R^2 = 0.307$					
Adjusted $R^2 = 0.298$					

The results in Figure 2 and Table 3 revealed that tangible resources, namely access to ICT facilities ($\beta = 0.263$, $t = 4.133$, $p = 0.000 < 0.05$) and university ICT policy ($\beta = 0.285$, $t = 3.819$, $p = 0.000 < 0.05$), positively and significantly predicted e-learning implementation. However, ICT teaching facilities ($\beta = 0.093$, $t = 1.745$, $p = 0.082 > 0.05$) and library e-resources ($\beta = 0.010$, $t = 0.146$, $p = 0.884 > 0.05$) positively but insignificantly predicted e-learning implementation. R^2 suggested that tangible resources explained 30.7% ($R^2 = 0.307$) of the variation in e-learning implementation. Adjusted R^2 indicated that the two tangible resources, i.e., access to ICT facilities and university ICT Policy, explained 29.8% of the variance (adjusted $R^2 = 0.289$). The coefficient of determination (R^2) suggested that 69.3% of the variation in e-learning implementation was accounted for by factors other than tangible resources. The results implied that while Hypotheses One and four (H1 and H4) were accepted, Hypotheses Two and Three (H2 and H3) were rejected. The Beta magnitudes suggest that university ICT policy was the most significant predictor of e-learning implementation.

5. Discussion of the Findings

The findings revealed that access to ICT facilities positively and significantly predicted e-learning implementation. This finding is consistent with the findings of previous scholars. For example, Arthur-Nyarko and Kariuki (2019), Adarkwah (2021), Innab and Alqahtani (2022), Lembani et al. (2019), Newen and Cheny (2022), Subashini et al. (2022), Yuliani and Mercuriani (2021) indicated that access to ICT facilities enhanced effective e-learning implementation. However, the finding was contrary to Siddiquah and Salim (2017), who reported that those students who had computers and internet facilities at home and at universities spent more time on computers for recreational and other purposes than for academic purposes. However, with the finding consistent with the findings of previous scholars, it can be surmised that access to ICT enhances effective e-learning implementation.

The finding to the effect that university ICT Policy positively and significantly predicted e-learning implementation is also consistent with the findings of previous scholars. For instance, De Freitas and Oliver (2005) found that the e-learning policy led to effective e-learning implementation. MacKeogh and Fox (2009) revealed that successful implementation of e-learning required ICT policy establishing institutional standards, the development of a university strategy, institutional quality standards, and a central unit to provide support to faculties. Consistently, Priatna et al. (2020) indicated that e-learning policy is a binder for the academic community to run e-learning. Similarly, Teo et al. (2020) revealed that the effectiveness of e-learning was enhanced by policies including continuous standardisation efforts and a sound regulatory system, applying a socially appropriate online pedagogy, raising public awareness, and building e-learning communities. Therefore, the successful implementation of e-learning policies is imperative.

The finding that universities ICT teaching facilities insignificantly predicted e-learning implementation was contrary to the findings of previous scholars. For example, Akinde and Adetimirin (2017), Asubiojo and Ajayi (2017), Eze et al. (2018), Gupta et al. (2022), Hailye (2020), Matviichuk et al. (2022), Ouma (2021), and Semlambo et al. (2022) indicated that ICT teaching facilities related to e-learning implementation. Possibly, the

finding was contrary to the findings of most scholars because the facilities of the universities were not accessible to students when outside the university campus. With respect to the finding that library e-resources insignificantly predicted e-learning implementation, it agreed with Olaniran et al. (2017), who revealed low utilisation of e-learning resources in teaching. This suggested that the existence of e-resources did not automatically suggest effective implementation of e-learning, as teachers did not use them. However, the finding disagreed with most scholars as they indicated that libraries e-resources enhanced implementation of learning, such as Ibieta et al. (2017), Mugizi and Amwine (2020), Nwigbo and Madhu (2016), Olaniran et al. (2017), and Shamim and Raihan (2016). However, the finding was contrary to what was conjectured because library e-resources might not be accessible to teachers and students for online learning activities during lecture time.

6. Conclusions

The discussion above led to the conclusion that access to ICT facilities and university ICT policies were imperative for the implementation of e-learning. Access to ICT facilities was imperative because when the facilities are accessible, teachers and students easily find them for use. For universities ICT policies, these provided support and were binders for the academic community to run e-learning. However, the discussion led to the conclusion that ICT teaching facilities and library e-resources did not necessarily lead to e-learning implementation. This is because the ICT facilities of the universities and libraries e-resources might not be accessible to teachers and students for online learning activities during lecture time. For instance, while not in touch with ICT staff at the universities, lecturers did not have rights to start and share online classes using Zoom. In addition, students had the tendency to be more interested in interacting with social media than learning content.

7. Recommendations

The study recommends that university managers make efforts to make ICT facilities accessible to students and develop policies guiding the implementation of e-learning. The managers can help students purchase ICT facilities at a lower cost and provide automatic rights to lecturers to use facilities such as Zoom without needing support from ICT staff. The policies will imperatively standardise e-learning activities and enforce involvement in e-learning. For universities, ICT resources and library e-resources should be made more accessible to lecturers and students when they are off campus. This was because university ICT facilities and library e-resources were not more accessible to teachers and students outside campus.

8. Limitations

This study makes imperative contributions by showing how tangible resources can enhance e-learning implementation effectiveness. However, limitations emerged. For instance, the study assessed only one aspect of RBT theory, namely tangible resources, while the other resources, namely intangible resources and capabilities, were not considered. Therefore, future research should consider all aspects of RBT. In addition, the current study considered only the quantitative approach, limiting in-depth analysis. Therefore, future studies should consider the use of the qualitative approach for in-depth analysis.

Declaration

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Appendix A: Study Instrument

Section A: Demographics		
Demographics Profiles (BP)	BP1	Sex (1 = Male, 2= Female)
	BP2	Age group (1= Up to 30; 2 = 30 but below 40; 3 = 40 and above).
	BP3	Education level (1= Diploma; 2 = Bachelor Degrees; 4 = Masters, 5 = PhD)
	BP5	Academic rank (1 = Assistant lecturer, 2= Lecturer, 3 = Senior, 4= Lecturer, 4= Associate professor, 5 = professor)
Section B: E-learning Implementation		
Student-Student E-Interaction (SSI)	SSI1	Students are able to learn from reading other students' comments posted on online platforms.
	SSI2	Students read and comment on posted reports of others on the course on online platforms.
	SSI3	Online comments and questions from other students help individual students learn easily.
	SSI4	Students have developed effective electronic communication skills through online interaction.
	SSI5	Interacting online increases students learning motivation.
	SSI6	Students enjoy working on collaborative online activities.
Student-Teacher E-Interaction (STI)	STI1	The work I do at this university gives me a sense of meaning and purpose.
	STI2	I am zealous about my job at this university.
	STI3	Students ask questions during online lessons.
	STI4	I am able to make students share ideas during online classes.
	STI5	I am able to know how students are acting during online classes.
	STI6	I make students stay busy during online classes.
	STI7	I am able to use all kinds of interesting materials in online classes.
	STI8	I get to do a lot in this class, not just listen to my teacher talk.
	STI9	Involve students in the learning process during online lessons.
	STI10	I am able to explain content to students sufficiently when teaching online.
Student-Content E-Interaction (SCT)	SCI1	The use of the learning management system is simple and easy for students.
	SCI2	The materials in the system are easily searchable and available to students.
	SCI3	The online system provides sufficient instructions for successful usage.
	SCI4	Course information can be easily found within the system by students.
	SCI5	The system is adaptable for student interaction and group activities.
	SCI6	The system interface is well organised and can be customised to meet users' needs.
	SCI7	The students are comfortable using web-oriented applications for course preparation.
	SCI8	E-learning provides students with the opportunity to practise what they learn in the lesson.
	SCI9	The examples given during e-learning enable students to concretize the subject.
	SCI10	E-learning materials stimulate students' interest in the course.
	SCI11	The online materials in the course I teach support student learning.
Section: Tangible Resources		
ICT Teaching Facilities (ITF)	ITF1	The online materials in the course I teach support student learning.
	ITF2	Internet speed is sufficient on the campus of this university.
	ITF3	Computers are fast enough to be used for instructional activities at this university.
	ITF4	The university provides sufficient internet on campus.
	ITF5	This university provides me with sufficient opportunities to improve my technology knowledge.

	ITF6	Computer rooms or laboratories lighting, air conditioning, and arrangement are suitable for instruction in this university.
	ITF7	The computers of the university have sufficient licenced software programmes, such as Zoom.
	ITF8	Offices and classes have ICT equipment.
Access to ICT facilities (ACT)	ACT1	At this university, there are sufficient computer laboratories.
	ACT2	In this university, there are sufficient computers for lecturers.
	ACT3	In this university, technology classrooms and laboratories are available whenever I need
	ACT4	Using the ICT facilities of the university, I easily get electronic information useful for teaching and learning.
University ICT Policy (UIP)	UIP1	University administrators ask lecturers their opinions on innovative ICT applications needed.
	UIP2	Lectures inform students about the administration's prospective technological endeavours.
	UIP3	The university has established guidelines for the use of ICT in teaching and learning.
	UIP4	The university has a policy in place focused on ICT implementation in the teaching and learning system.
	UIP5	The university's ICT policy provides possibilities for the use of ICT in teaching and learning.
	UIP6	The university has guidelines for curriculum content uploading or delivery.
Libraries E-resources (LE)	LE1	The university has online databases.
	LE2	The university has an online public access catalogue.
	LE3	Can access diverse electronic journals using the university portal.
	LE4	Can access a variety of electronic books using the university portal.
	LE5	I have been provided an email for library access.
	LE6	The university library provides electronic document delivery services.
	LE7	The university library's e-resources interface makes it easy to access e-journals.
	LE8	The library has facilities for using internet services.