Universities' Capabilities and Effective Implementation of E-Learning in Public Universities in Kampala City, Uganda

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Abstract

The COVID-19 pandemic restricted access to campuses of universities owing to intermittent lockdowns. Consequently, educational institutions were forced to adopt virtual teaching techniques to ensure continued teaching and learning. However, the effective implementation of online education in universities in Uganda faced capability challenges that hindered its effectiveness. Therefore, this study investigated the influence of universities' capabilities on the effective implementation of e-learning in public universities in Kampala City, Uganda during and beyond the COVID-19 pandemic period. Anchoring in resource-based theory (RBT), universities' capabilities for effective implementation e-learning studied included experimentation, integration capability, and content management. Using the quantitative approach, cross-sectional data was collected from a sample of 312 academic staff from Kyambogo and Makerere Universities, the only two public universities located in Kampala City, Uganda. Data was

collected using a self-administered questionnaire. The data was analysed using descriptive and inferential statistics. Descriptive statistics involved the calculation of means while inferential analysis involved structural equation models (SEM) using SmartPLS. The results revealed that content management and integration capability positively and significantly predicted e-learning implementation. However, experimentation negatively and insignificantly predicted e-learning implementation. The study concluded that content management and integration capability are vital for e-learning implementation. Nonetheless, experimentation is not a probable requirement for the effective implementation of e-learning. Therefore, it was recommended that university managers should develop integration capabilities, and should support lecturers to improve their content management, but experimentation should not be prioritised in the implementation of e-learning.

Keywords: Capabilities; E-learning; Experimentation; Integration; RBT

Introduction

The use of hybrid teaching involving both on-campus and virtual teaching techniques has become part and parcel of universities since 2020 following the COVID-19 pandemic that restricted access to university campuses because of intermittent lockdowns (Segura-Berges et al., 2022). The lockdowns aimed at reducing contact between students and other people in the universities to curtail the spread of the disease (Mugizi & Nagasha, 2023). E-teaching and learning was the best option for ensuring that the epidemic did not spread because it guaranteed social distancing. Virtual teaching techniques enabled conducting classes from any place and in precarious circumstances that prevented learners and teachers from reaching universities (Maatuk et al., 2022). However, effective implementation of online education in universities in Uganda faced challenges that included lack of internet data, erratic internet connectivity, failure to record lessons and lack of Zoom links by lecturers, poor class control, and uncontrolled attendance by learners (Ouma, 2021). Uganda not being different from other developing countries, e-learning implementation also suffered the challenge of lack of the competencies needed among staff to teach using e-learning (Rapanta et al., 2020). In addition, few students in Uganda universities had a good attitude towards e-learning (Twinamasiko et al., 2020). Incorporating information communication and technology (ICT) teaching and learning into the mainstream curriculum in Ugandan universities was hindered by the fact that the pedagogy was still largely based on the traditional teacher-centred approach. Consequently, there was limited scope for e-learning technologies on top of low access to the needed technologies to keep abreast with the 21st-century education requirements (Tumwesige, 2020).

At Kyambogo University, in 2021 students protested against the implementation of e-learning. The students complained that few lecturers participated in online teaching and that they suffered the impediment of poor internet connectivity, especially those living in

rural areas in rural areas (Shabomwe, 2021). At Makerere University, there was also a protest at the beginning of 2022, with students rejecting the introduction of a blended learning mode in all courses. The students argued that they lacked the money to purchase internet bundles to access the university's online teaching platforms, and that some lecturers were unable to teach online (Mujuni, 2022). The challenges of low competence among university teaching staff to teach using e-learning and the poor attitude among the majority of students in Ugandan universities made it imperative for this study to probe the implementation of e-learning in public universities in Uganda. Particularly, this was because, in the two public universities of Kyambogo and Makerere, there were open protests against e-learning implementation. The study considered universities' capabilities, which largely pertain to abilities at the disposal of organisations that are essential for the effective implementation of projects such as e-learning.

The notion of capabilities emanates from the resource-based theory (RBT) propounded by Penrose (1959) and developed by scholars such as Barney (1986). RBT explains that among the essential resources of organisations are their capabilities or their capacity to put to use resources relying on organisational processes (Huang & Li, 2017). Capabilities are specific information-based processes within the human resource of the organisation and incorporated into high-order systems (Guesalaga et al., 2018). Capabilities are central to explaining how organisations manage the development of innovations and integrate acquisitions (Costello & McNaughton, 2018). Capabilities indicate a wide set of the organisation's abilities, including handling changes in the environment, adapting to the changes and continuously producing innovative services such as e-learning. Therefore, capabilities explain how organisations perform in a competitive environment (Schriber & Löwstedt, 2015). Capabilities emerge as a result of interaction between human and material resources; hence they are embedded in the skills, strength and know-how of individuals and groups of human actors in the organisation (Sims et al., 2013). The capabilities necessary for the implementation of e-learning include experimentation, integration capability and content management (Nayeemunnisa & Gomath, 2020). This study investigated the influence of capabilities on the effective implementation of e-learning during and beyond the COVID-19 pandemic era in public universities in Uganda. The study tested the following hypotheses:

H1: Experimentation has a significant influence on effective e-learning implementation.
H2: Integration capability has a significant influence on effective e-learning implementation.
H3: Content management has a significant influence on effective e-learning implementation.

Capabilities and E-Learning Implementation

Capabilities are the covert competencies or expertise deployed in an organisation's operations underscored by accumulated know-how (Lee et al., 2020). They describe the organisational specifics in which members operate to contribute to the service, growth and attainment of other organisational goals (Dev et al., 2018). Capabilities are highly considered to be a determining factor for organisational effectiveness (Wang & Zeng, 2017). Capabilities enable organisations to perform different things, making it possible to deal with problems, hence strong continuity

(Dev et al., 2018). Therefore, capabilities are essential for the implementation of innovations such as e-learning. The capabilities necessary for the implementation of e-learning include experimentation, integration capability, and content management (Nayeemunnisa & Gomath, 2020). Based on Rogers' innovation diffusion theory, experimentation refers to the trialability of an innovation or the degree to which innovations can be tested or experimented on a limited basis (Al Mamun, 2018; Kule et al., 2021). Experimentation or trialability is how easily an innovation may be tried out or tested on a small scale (Yuen et al., 2021). Experimentation describes the degree to which people seek to try out the innovation before deciding to adopt it or not (Al-Rahmi et al., 2019). Trialability is about the piloting of an innovation before deciding to adopt it (Klemets et al., 2019). Experimentation provides an opportunity for potential adopters to try the innovation (Yuen et al., 2021).

There are several studies (Al-Rahmi et al., 2019; Cao et al., 2012; Daouk & Aldalaien, 2019; Kusdibyo et al., 2019; Lang et al., 2017; Ndongfack, 2021; Park et al., 2018; Pinho et al., 2021) that have examined the importance of experimentation in the implementation of e-learning. While the studies above show that scholars have made significant efforts to relate experimentation and e-learning implementation, contextual and empirical gaps emerged. Except for the study by Ndongfack (2021) in Cameroon, the studies were skewed to the Asian (Al-Rahmi et al., 2019; Cao et al., 2012; Daouk & Aldalaien, 2019; Kusdibyo et al., 2019) and Western world (Vidal & Gómez, 2015; Lang et al., 2017; Park et al., 2018; Pinho et al., 2021) contexts with higher ICT levels than those of African countries. On the other hand, Daouk and Aldalaien (2019) and Park et al. (2018) came up findings contrary to those of other scholars indicating that experimentation insignificantly predicted e-learning implementation, suggesting that the importance of experimentation in e-learning implementation is not certain. These contextual and empirical gaps created the need for this study in the context of African countries to further test the relationship between experimentation and implementation of e-learning.

Regarding integration capability, it refers to the ability to combine the capabilities of the organisation as inputs to enable the performance of the system (Forés & Camisón, 2016; Mikalef & Pateli, 2017). Integration capability is the enabling interconnections, interfaces, relationships and dependencies in the organisation's capabilities for effective service delivery (Battleson et al., 2016). Integration capability enables and assures interconnections between different components to effectively work together, leading to the effective performance of the system (Xu et al., 2018). Integration is directly linked to the operations and competitive advantage of organisations (Vanpoucke et al., 2017). Therefore, integration capability is necessary for effective e-learning implementation in universities. Some studies (Adiyarta et al., 2018; Costello & McNaughton, 2018; Teo et al., 2020; Yaniawati et al., 2020) have examined the effect of integration capability on e-learning implementation. Precisely, the literature above shows that integration capability leads to e-learning implementation. However, with the slow implementation of e-learning in public universities in Uganda, it was vital for this

study to investigate the capability integration in universities in Uganda and how it is related to e-learning implementation.

Concerning content management, it is the activity of creating, storing, managing and delivering digital learning content in a repository (Fadil & Khaldi, 2020). Content management provides learners with resources in various formats such as videos, quizzes and forum discussions to support their learning through enabling access to the learning management system (Chaw & Tang, 2018). Content management enables course authors and learners to work together, access learning objects, develop new learning information, have discussions through forums, interact outside of the classroom, and create and administer tests and quizzes (Ushakov, 2017). Scholars (Almaiah &; Chaw & Tang, 2018; Elzainy et al., 2020; Hantoobi et al., 2021; Maphalala & Adigun, 2021; Mtebe & Raphael, 2018; Romadhon et al., 2022; Yew & Jambulingam, 2015) studied the importance of content management on e-learning implementation. Nonetheless, the results of the study by Mtebe and Raphael (2018) in the context of Tanzania, an East African country, were controversial, suggesting that some aspects of content management, such as content quality, were not significantly related to e-learning success. This attracted the attention of this study in the context of another East African country, specifically Uganda, to examine the relationship between content management and e-learning implementation.

Methodology

The methods that served as the basis for the study investigations are covered in this section. The methods facilitated gathering and analysing data about universities' capabilities and the effective implementation of e-learning.

Research design and sample

The cross-sectional and correlational research designs were the strategies followed in carrying out investigations in this study. The cross-sectional design was adopted because cross-sectional studies gather information on what is happening about an issue under study at the time of the study investigations. The goal of adopting the cross-sectional design was to evaluate what was happening at the time in the universities concerning universities' capabilities and e-learning implementation. The design was appropriate because it permits the use of a self-administered questionnaire when gathering data (Wang & Cheng, 2020). The correlational research design was used to identify relationships between the determinant (capabilities) and the outcome variable (effective implementation of e-learning). Thence, the link between universities' capabilities and the effective implementation of learning was examined. The designs aided the collection of quantitative data required for descriptive and inferential analyses. The population of the study comprised 1,883 full-time lecturers – 451 from Kyambogo University and 1,432 from Makerere University, in Kampala City. Using the table for sample size determination by Krejcie and Morgan (1970), the sample size comprised 318 lecturers. The sample from each

university was proportionately determined to ensure representativeness. Thus, those from Kyambogo University were 76 lecturers and those from Makerere University were 242 lecturers.

Measures of the variables

The study employed a self-administered questionnaire to collect data from the respondents since it was practical for gathering information from a large number of study participants. The measures of the independent variable of capabilities were experimentation (Moore & Benbasat, 1991; Usluel et al., 2008), integration capability (Jamieson-Proctor et al., 2007) and content management (Wang & Ahmed, 2004). The measures of effective implementation of e-learning the dependent variable were student-student, student-teacher and student-content e-interaction (Downer et al., 2015; Malinovski et al., 2012; Yılmaz & Karataş, 2018). The indicators of the measures were anchored in a five-point scale with 1 = Strongly Disagree, 2 = Disagree, 3 = Not Sure, 4 = Agree and 5 = Strongly Agree. The anchors enabled the collection of ordinal data amenable to quantitative analysis.

Data analysis methods

The data analysis process involved performing descriptive and inferential analyses. The descriptive analysis involved calculating means to show how the respondents ranked the universities' capabilities and e-learning implementation. The inferential analysis involved carrying out structural equation modelling (SEM) aided by SmartPLS software. SEM was the basis for showing the influence of universities' capabilities on e-learning implementation. The models built demonstrated the fit of the measures and the relationship between universities' capabilities and e-learning implementation.

Results

In this section, the study's findings on universities' capabilities and e-learning implementation effectiveness are presented. The findings comprise measurement and structural equation models and structural path estimates.

Demographic attributes of the study participants

The results for demographic attributes revealed that the modal percentage (70.8%) was of males while the females were 29.2%. Concerning age, those who were 40 years and above were the majority percentage (68.3%), followed by 26.0% who were between 30 and 40 years, and the remaining 5.7% were up 30 years. In terms of qualifications, 55.8% were holders of master's degrees, 40.4% had PhDs, while 1.9% and another 1.9% possessed bachelor's degrees and postgraduate diplomas, respectively. Regarding academic ranks, 50.0% were assistant lecturers while 38.5% were lecturers and 9.6% were senior lecturers. The smallest percentage (1.9%) was of associate professors. The demographic attributes of the study participants suggested that a variety of academic staff participated in the study. Therefore, the data represented the views of various categories of academic staff of the universities.

Measurement models

To establish how academic staff rated universities' capabilities, means were calculated. Also, validity tests in terms of average variance extracted (AVE) and heterotrait-monotrait (HTMT) assessments, and reliabilities comprising Cronbach's alpha (α) and composite reliability (CR) were carried out. In addition, the value inflation factor (VIF) to assess the existence of collinearity or correlation among the independent variables was calculated. Tables 1 and 2 show the results.

Measurement model 1

The measurement model (Table 1) presents results, including descriptive statistics in terms of means showing how the respondents rated the capabilities of the universities and the level of e-learning implementation. The table also contains convergent and discriminant validity results in terms of AVE and HTMT ratio of correlations, respectively.

Table 1: Descriptives, means and heterotrait-monotrait ratio (HTMT) for capabilities

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**	**EX**	**IC**	**CM**	**OC**
EX	3.57	0.871				
IC	3.49	0.890	0.683			
CM	3.74	0.883	0.473	0.531		
UC	3.62	1.000	0.815	0.886	0.788	

Key: ELI = E-learning Implementation, EX= Experimentation, IC = Integration capability, CM= Content management, UC= Universities Capabilities, SCI = Student-Content E-Interaction, SSI = Student-Student E-Interaction, STI = Student-Teacher E-Interaction

The results in Table 1 reveal that e-learning implementation was considered to be high (mean = 3.55) since the mean was close to code four, which on the scale used corresponded to "agree", implying a high rating. The e-learning implementation construct of student-content e-interaction was rated moderate (mean = 3.42 [close to code three for not sure]), which implies fair implementation. For the student-student (mean = 3.54) and student-teacher e-interaction (mean = 3.68), they were rated high. Thus, while e-learning moderately enabled student-content e-interaction, it highly enhanced student-student and student-teacher e-interaction. The respondents rated experimentation (mean = 3.57) and content management (mean = 3.74)

high but integration capability (mean = 3.49) was rated moderate. Overall, the capabilities of the universities were rated high. Model 1 (Table 1) shows that the measures for both e-learning implementation and capabilities satisfied the AVE requirements because values were above 0.5, the lowest level. Hence, the indicators for each construct were fit measures because they were close to one another (Hair et al., 2021). The model further reveals that HTMT ratios of correlation confirmed the discriminant validity of the constructs as all the values were below 0.90 (Purwanto & Sudargini, 2021). The AVE and HTMT ratios of correlation values suggested that the data was suitable for modelling.

Measurement model 2

The measurement model (Table 2) presents reliability (Cronbach's alpha [α] and composite reliability [CR]) and collinearity [VIF]) assessment results. The results indicate that the data collected on capabilities and e-learning constructs were suitable for structural modelling.

Table 2: Construct reliability and validity for e-learning implementation and capabilities

Measures	A	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
Experimentation	0.852	0.931	2.216
Integration capability	0.876	0.942	2.507
Learning content management	0.868	0.938	1.755
Organisational capabilities	1.000	1.000	

The reliability results (Cronbach's alpha [α] and composite reliability [CR]) in Table 2 show that all the values were above 0.70, which is the lowest level for both (Hair et al., 2021). Therefore, the results were suitable for further analyses. The variance inflation factor (VIF) results, which reveal the existence of collinearity or correlation, were all below the maximum of 5, suggesting that there was a correlation (Marcoulides & Raykov, 2019). Independence (no collinearity) between the independent variables is the requirement for predictive tests such as SEM. Therefore, the low values meant that the measures of universities' capabilities independently predicted e-learning implementation effectiveness.

Structural equation model for intangible resources and e-learning implementation

To infer whether universities' capabilities influenced e-learning implementation, a structural equation model was carried out. The model (Figure 1) developed describes the links between universities' capabilities variables and e-learning implementation.

Figure 1: Structural equation model findings for universities' capabilities and e-learning implementation

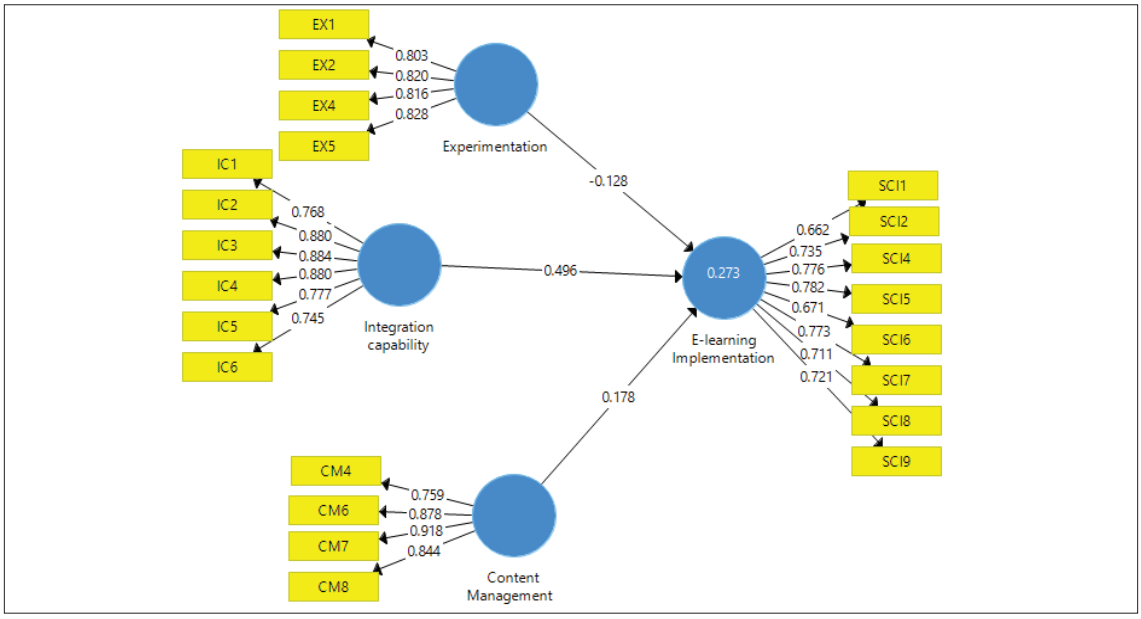

Figure 1 reveals that e-learning implementation comprised only student-content e-interaction indicators. Therefore, the remaining constructs, namely student-student and student-teacher e-interaction, loaded in the model. The model presents path coefficients for the constructs, coefficients of determination (R2 and adjusted R2) and related t statistics and p-values (Table 3). R2 tested the model's predictive power. The model included testing three hypotheses to the effect that experimentation (H1), capability integration (H2) and content management have a positive significant influence on effective e-learning implementation. The structural equation model estimates (Table 3) indicate the results.

Table 3: Structural equation model estimates for capabilities and e-learning implementation

	β	Mean	STD	T	P
Experimentation E-learning implementation	-0.128	-0.115	0.080	1.600	0.110
Integration capability E-learning Implementation	0.496	0.491	0.095	5.192	0.000
Content Management E-learning Implementation	0.178	0.178	0.089	2.000	0.046
R^2 = 0.273					
Adjusted R^2 = 0.265					

The structural models results (Figure 1 and Table 2) revealed that universities' capabilities, namely integration capability ($\beta = 0.496$, $t = 5.192$, $p = 0.000 < 0.05$) and content management ($\beta = 0.178$, $t = 2.000$, $p = 0.046 < 0.05$), positively and significantly influenced e-learning implementation. However, experimentation ($\beta = -0.128$, $t = 1.600$, $p = 0.110 < 0.05$) negatively

and insignificantly predicted e-learning implementation. R2 suggested that capabilities explained 27.3% (R2 = 0. 273) of the variation in e-learning implementation. Adjusted R2 indicated that the two capabilities, namely content management and integration capability, explained 26.5% (adjusted R2 = 0.265). The coefficient of determination (R2) suggested that 72.7% of the variation in e-learning implementation was accounted for by factors other than capabilities. The results imply that while hypotheses two and three (H2 and H3) were accepted, hypothesis one was rejected. The beta magnitudes suggest that capability integration was the most significant predictor in e-learning implementation.

Discussion of the Findings

The finding to the effect that integration capability positively and significantly influenced e-learning implementation is also in agreement with the findings of previous scholars. For instance, Adiyarta et al. (2018) reported that integrating different capabilities of the institution in an integrated e-learning readiness model leads to the successful implementation of e-learning. Relatedly, Costello and McNaughton (2018) revealed that integrating dynamic capabilities led to content alignment and integration enhancing the implementation of e-learning. In the same vein, Teo et al. (2020) revealed that integration capability through building efficient e-learning infrastructure and making continuous standardisation efforts leads to the effectiveness of e-learning. Also, Yaniawati et al. (2020) established that the integration of e-learning into a resource-based learning method produced better learning. With the findings agreeing with the findings of previous scholars, it can be surmised that capability is necessary for effective e-learning implementation.

The finding that content management positively and significantly influenced e-learning implementation concurred with the findings of previous scholars. For example, Almaiah and Alyoussef (2019) reported that course design and course content support had a significant effect on the actual use of e-learning systems. Consistently, Chaw and Tang (2018) found that learning content management had a significant relationship with learning effectiveness. In the same vein, Elzainy et al. (2020) revealed that learning content management, including theoretical lectures, problem-based learning sessions, seminars and tutorials led to students' high satisfaction with virtual learning. Also, Maphalala and Adigun (2021) and Yew and Jambulingam (2015) indicated that online content development enhanced e-learning implementation. However, on the contrary, the finding did not agree with Mtebe and Raphael (2018), who reported that course quality had no significant effect on learners' satisfaction with the e-learning system. Nonetheless, with the findings of the study in agreement with the findings of most scholars, it can be inferred that content management is essential for e-learning implementation.

Nonetheless, the finding to the effect that experimentation negatively and insignificantly influenced e-learning implementation was contrary to the findings of previous scholars. For example, Al-Rahmi et al. (2019), Kusdibyo et al. (2019) and Ndongfack (2021) indicated that trialability (experimentation) had a strong impact on students' behavioural intention to use the e-learning system. Relatedly, Cao et al. (2012) indicated that e-learning experimentation

promoted the intrinsic motivation, learning quality, ability to resolve ill-structured problems and creative thinking ability of the students, thus enhancing e-learning. On their part, Lang et al. (2017) revealed that experimenting with teachers learning from one another in the same manner students learn from each other using creativity and experimentation in student-led classroom environments enhances the implementation of e-learning. Similarly, Vidal and Gómez (2015) revealed that ICT experiments of team-teaching seminars brought interactivity between students, between students and teachers and among students, and that ICT increased motivation among students. With the finding of the study being contrary to the findings of previous scholars, it can be deduced that in the context of universities in Uganda, experimentation is not paramount for the implementation of e-learning. This is because while lecturers had already experimented, it did not influence e-learning implementation.

Conclusions

The discussion above led to the conclusion that integration capability and content management are vital for e-learning implementation. For integration capability, when lecturers ensure that students have acquired the knowledge, skills, abilities and attitudes to deal with ongoing technological change, use different ICT applications, and ensure that they engage in sustained involvement with curriculum activities using ICT, there will be effective e-learning implementation. In addition, there is effective e-learning implementation if using ICT lecturers support the different elements of the learning process, engage learners in independent learning, organise content and upload it on the e-learning platforms. Concerning content management, effective e-learning takes place when lecturers maintain and constantly upgrade content stored in the system, and use the knowledge on the university ICT system to carry out teaching and to share knowledge with colleagues. However, experimentation is not a probable requirement for the effective implementation of e-learning. Therefore, trying out various ICT teaching applications and piloting e-learning do not necessarily lead to e-learning effective implementation.

Recommendations

The conclusions above led to the recommendation that university managers should develop integration capabilities. This should involve ensuring that lecturers acquire the knowledge, skills, abilities and attitudes to deal with ongoing technological change, provide different ICT applications, and ensure lecturers engage in sustained involvement with curricular activities using ICT. In addition, university managers should ensure that using ICT lecturers support the different elements of the learning process, engage learners in independent learning, and organise content and upload it on the e-learning platforms. University managers should also support lecturers to improve their content management. This should involve ensuring that lecturers maintain and constantly upgrade content stored in the system, use the knowledge on the university ICT system to carry out teaching and share knowledge with colleagues.

However, experimentation should not be prioritised in the implementation of e-learning. Thus, lecturers do not need to try out various ICT teaching applications and to pilot e-learning.

Limitations

The findings of this study reveal the importance of universities' capabilities when implementing e-learning. However, some limitations should be addressed by future scholars. For example, the study considered only one aspect of resource-based theory (RBT), specifically capabilities, while the other resources, namely tangible resources and intangible resources, were not studied. Thus, future scholars study all three RBT resources to establish how they interact with one another in the implementation of e-learning. In addition, the results for hypothesis one on experimentation were contrary to what was conjectured. Therefore, future studies should further carry out this study in more universities to ascertain the importance of experimentation in e-learning implementation. Further, this study used only the quantitative approach, limiting in-depth analysis. Future researchers should carry out mixed or qualitative studies for a deeper exploration of the influence of universities' capabilities on e-learning effective of implementation.

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Appendix A: Study Instrument

Section A: Demographics		
Demographics	BP1	Sex (1 = Male, 2= Female)
Profiles (BP)	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	SSI1	Students are able to learn from reading other students' comments posted on online platforms
(SSI)	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 to learn easily
	SSI4	Students have developed effective electronic communication skills through online interaction
	SSI5	Interacting online increases students learning motivation
	SSI6	Students enjoy working in collaborative online activities
Student-Teacher E-Interaction (STI)	STI1	The work I do in this university gives me a sense of meaning and purpose
	STI2	I am zealous about my job in 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 on-line 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 usage 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 users' needs
	SCI7	The students are comfortable in using web-oriented application for course preparation
	SCI8	E-learning provides students the opportunity of practicing what they learn in the lesson
	SCI9	The examples given during e-learning enable students to concretise 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 C: Capabilities		
Experimentation (EX)	EX1	I have had a great opportunity to try various ICT teaching applications
	EX2	I have access to and try ICT teaching relevant applications
	EX3	I have had the opportunity to try out how I can make use of ICT in teaching and learning
	EX4	Being able to try out ICT in teaching was important in my decision to use it.
	EX5	I decided to adopt ICT in learning after I carried out a pilot test
Integration Capability (IC)	IC1	In my class, students have acquired the knowledge, skills, abilities and attitudes to deal with ongoing technological change
	IC2	I have used different ICT application to teach effectively
	IC3	Using ICT applications, I have been able to engage in sustained involvement with curriculum activities
	IC4	Using ICT I have supported elements of the learning process
	IC5	I have undertaken formative and/or summative assessment using ICT

	IC6	With ICT learners have been able to engage in independent learning through access to education at a time, place and pace of their own choosing
Content Management (CM)	CM1	I use ICT technologies to capture and store teaching content
	CM2	The technology I use helps to codify and categorise ideas in a format that is easier to save for future use
	CM3	ICT technologies facilitate the processes of capturing, categorising, storing, and retrieving teaching content
	CM4	I maintain and constantly upgrade content stored in the system
	CM5	When we need some teaching content, I know where to get it in the ICT system
	CM6	Using the university ICT system, I very often use knowledge there in to carry out teaching
	CM7	The university ICT system helps staff to share knowledge and learn from each other
	CM8	Lecturers access and use information and knowledge saved in the system of the university