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Abstract

With the COVID-19 pandemic outbreak, e-learning has become a mandatory component of all educational institutions worldwide, including schools, colleges, and universities. The abrupt transition from in-person to online learning has had a variety of effects on learning. The purpose of this study is to evaluate the "effect of the application of electronic learning system on learning effectiveness amidst coronavirus pandemic at University of Rwanda" using the College of Agriculture, Animal Sciences, and Veterinary Medicine (CAVM) as a case study. The study's goal was to assess the impact of electronic learning system resources on learning effectiveness in UR CAVM during the COVID-19 pandemic. It also had the following hypotheses: there is no relationship between the availability of electronic learning system resources and learning effectiveness in UR-CAVM during the COVID-19 pandemic. The researcher used a descriptive research design to interpret and analyses the data. The study population was 2161, with a sample size of 337 participants. Data was gathered using a structured questionnaire with five-point Likert scales. Quantitative data was examined using frequencies, percentages, standard deviations, means, and regression analysis. The study found that the use of electronic learning systems during COVID-19 had a significant impact on learning effectiveness at the University of Rwanda. This result was obtained through regression analysis using the software SPSS 21 Version. As a result, it was determined that the variable has a significant impact on learning effectiveness. Specifically, electronic learning systems were available during COVID-19 ($p\text{-value}=0.000$, $\beta=1.291$). According to the findings of this study, academicians require advanced skills, and universities should invest in capacity building in terms of technological packages for Open Distance eLearning (ODeL) pedagogical approaches, instruction design, and internet connectivity. It is recommended that training programs and ICT facilities for both students and lecturers be implemented to ensure an effective online learning experience. Parents should be mobilized about the importance of creating a technological environment at home for their children, because academic achievement is dependent on how parents assist students at home. Students require electronic devices that allow them to access e-learning.

Keywords: *Electronic, Learning System, Learning Effectiveness, Coronavirus Pandemic, University of Rwanda.*

1.0 Introduction

In the twenty-first century, around the end of the 2019 year in a small region of China called Wuhan, the higher learning and technological business was attacked by a dangerous epidemic called covid-19, and the entire country was in cries that the pandemic killed thousands of people in fifty days while causing thousands of others to suffer greatly. The pandemic hampered the effectiveness of face-to-face learning (Shereen et al. 2020). Days after the covid-19 outbreak, it spreads around the world, severely affecting the economies of many countries. Within a few months, this pandemic had completely altered the operating conditions of all industries. Its disadvantages were unstoppable and uncontrollable for many educational institutions. About 120 countries around the world have ordered the suspension of face-to-face learning, and millions of students have returned home for curfew or lockdown. The education systems of countries and higher learning institutions were severely impacted. Higher education institutions in developed countries adopted e-learning as an alternative to face-to-face instruction, which had become impossible due to COVID-19, but this was not without its challenges. Many higher education institutions in Africa use e-learning as a means of teaching and learning, but they lack the necessary facilities and capital to improve their effectiveness and efficiency. Many studies found that access to institutions in Africa is less than 5%, compared to the global average of 16% (Gunga & Ricketts, 2007).

Many higher education institutions have become interested in information communication technology, particularly e-learning (Yieke, 2010). However, its use in developing countries, particularly in Africa, faces numerous challenges, including poor internet connectivity, insufficient materials, high technology costs, insufficient skills, and fear of change (Gunga & Ricketts, 2007). In Rwanda, the government of Rwanda, through the Ministry of ICT and Innovation, has launched a scheme to donate laptop computers to students beginning with undergraduate studies as a way to provide Rwandan scholars with information technology skills and support their studies in order to contribute to the country's development through ICT literacy (MINICT, 2016). All schools have been closed since March 2020, and students have been sent home as part of the measures to limit the spread and contamination of the COVID-19 pandemic (Rwanda Ministry of Health, 2020). Higher education institutions were required to shift their teaching and learning processes to a completely online mode, with courses uploaded on e-learning platforms such as Moodle and a variety of online video conferencing platforms (Rwigema, 2021).

1.1 Statement of the Problem

The use of IT in teaching and learning activities has been a pressing need for the adoption of e-learning systems as the sole means of dealing with the current COVID-19 pandemic threat in the education sector (Lestiyawati & Widyantoro, 2020). The urgent need for technology in education has become an obligation, but a number of factors related to the effectiveness of e-learning system deployment have been overlooked (Eze et al., 2018). The Kineo group (2012) suggests a number of other benefits of e-learning, including lower educational costs, faster delivery of educational materials, more effective methods of learning, and a lower environmental impact by reducing stationery requirements and minimizing waste. Bhuasiri et al. (2012) summarize the benefits of e-learning for stakeholders, which include increased information accessibility, better content delivery, personalized instruction, content standardization, accountability, on-demand availability, self-pacing, interactivity, confidence, and increased convenience. However,

Harerimana and Mtshali (2018) state that successful e-learning is dependent on the online learning readiness of the learners, teachers, and institution.

1.2 Objective of the study

This study is aiming at evaluating effect of the application of electronic learning system on learning effectiveness amidst coronavirus pandemic at university of Rwanda.

2.0 Literature Review

Firstly, this chapter reviews literature on effect of the application of electronic learning system on learning effectiveness amidst coronavirus pandemic at university of Rwanda.

2.1 Theoretical Framework

Theoretical framework explains deeply the models and theories discovered by theorists as well as conclusion they have drawn on them. This study is based on two theories such as blended learning and connectivism.

2.1.1 Blended Learning

Although there are various definitions of blended learning, the term refers to an instructional model that connects various forms of media such as text, audio, and video at different time points with face-to-face collaboration within the same session (Roseth, Akcaoglu, and Zellner, 2013). Blended learning combines face-to-face and online learning styles, and researchers define blended learning as when at least 30-79% of the materials are transmitted online. This model is also known as a blended pedagogical method, or a combination of didactic approaches and delivery styles (Al-Busaidi, 2013). However, blended learning can be defined as the combination of online teaching methods and face-to-face instruction (Ramirez-Arellano, Bory-Reyes, and Hernández-Simón, 2018). Driscoll (2002, p.1) defined blended learning as combining or mixing modes of web-based technology (e.g., live virtual classroom, self-paced instruction, collaborative learning, streaming video, audio, and text) to achieve an educational goal; combining various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) to produce an optimal learning outcome with or without instructional technology;

The researchers argued that a type of pedagogy associated with face-to-face learning and online teaching raises a number of issues. These issues include what to blend, whether to increase or decrease the hours of content transmission in the meaning, whether to be precise about the duration of time for face-to-face and online instruction, and how to address the problem of pedagogical quality in the meaning (Bocconi & Trentin, 2014; Porter, Graham, Bodily, & Sandberg, 2016). Porter, Graham, Spring, and Welch (2014) asserted that higher education institutions are welcoming and adopting blended learning at a high level, defining blended learning as an amalgamation of e-learning and face-to-face learning methodologies. Furthermore, the editor of the journal of synchronous Ibrahim and Nat International Journal of Educational Technology in Higher Education (2019) 16:12 Page 3 of 21 learning networks forecasted that "80-90% of higher education contents would become blended in coming decades," and at the time of this statement, researchers have begun to assert the "explosive growth of blended learning" and have highlighted that blended learning will become the "new normal" methods of learning.

2.1.2 Accessibility to E-Learning Facilities by Students and Lecturers

Polanyi (2016) defines e-learning as the delivery of knowledge via electronic media like the internet, extranet, satellite broadcast, audio, video tape, interactive TV, CD-ROM, electronic board, and e-library. E-learning involves teaching people using electronic devices like the internet, radio, e-library, CV, TV, and satellite broadcast (Olaniyi, 2018). In their early study on business facilitators' perception of the difficulties of e-learning in higher institutions in south west Nigeria, Kehinde and Olatunde (2018) found that e-learning provides direct feedback, motivates teaching, allows students to learn at their own pace, provides many sources of information, offers a variety of learning technologies, is inclusive and flexible, and provides many sources of information. Some Rwandan higher education institutions don't have enough computers or good internet connectivity for all students, making e-learning difficult. Rural networks are expensive and inefficient, preventing students from using e-learning even with materials. ICT implementation is expensive compared to Rwandan poverty. Many people lack PCs. Additionally, most teachers do not have personal computers, which threatens e-learning, especially during the COVID-19 pandemic. E-learning is hindered by expensive ICT tools (Okoro, 2021). Some universities have enough tools to empower students with e-learning, but others don't.

Some less developed countries lack enough power to run machines and other electronics. Electricity instability hurts city and town teachers and students. However, suburban and rural students always face power instability. TVs, radios, laptops, and computers have been damaged by irregular electricity supply. Some researchers said it's hard to use a computer with an unstable power supply (Jimoh-Kadiri, 2008). Access to e-learning in Rwandan higher education institutions is limited by a lack of technicians and networking and software engineers to repair and maintain computer facilities. Azuka, Nwosu, Kanu, and Agomuo (2006) stated that teaching and learning require adequate equipment, methodology, and computer programs and maintenance. Lack of confidence and training about e-learning prevents teachers and students from using it. The problem with using e-learning in higher education stems from the primary and secondary school curriculum, which has ICT weaknesses and most students lack ICT skills. Computer was not required in high school. The teacher and official training curriculum is poor. Agomuo (2007) said trainers and lecturers aren't empowered. This makes it difficult for teachers to prepare graduates for e-learning in higher education. Computer-based (e.g., digital videos, tablets, projector, operating systems) e-learning links digital content, system-based administrations, and mentoring support to help students and teachers interact. E-learning platforms are being developed to address COVID-19's effects, and many higher education institutions are adopting them to meet students' educational needs. Even though e-learning platforms are an alternative to blended learning or better classroom teaching, they are difficult (Johnson, Scholes & Whittington, 2008). Most HLIs resist e-learning system adoption due to poor awareness, management support, funding, infrastructures, management commitment to interactive knowledge environments, limited resources and awareness (Markus and Robey, 1998), inadequate training and manpower (Bhuasiri et al., 2012), and inadequate internet facilities.

2.2.3 E-learning teaching strategies

Effective online learning requires various strategies, many of which parallel those used in face-to-face instruction. Key elements include good communication skills and the use of questioning strategies to enhance problem-solving abilities in learners (Davis & Roblyer, 2005). However, online instructors must also address learners' needs through non-verbal strategies due to the lack

of verbal cues. Addressing learners' involvement and potential access issues is crucial, as these challenges can demotivate students. Anticipating and facilitating these challenges can improve online learning activities (Palloff & Pratt, 2003). Successful instructors engage students using tools like chat rooms and discussion boards, prompting them to employ higher-order thinking skills (Junk & Culbertson, 2004). The quality of contact between learners and instructors significantly impacts learning outcomes, with competent and highly involved instructors leading to better student achievement (Zhao et al., 2005).

The importance of instructors in online learning includes their knowledge, content delivery systems, teaching methodologies, and instructional tools (Easton, 2003; Menchaca & Bekele, 2008; Kennette & Redd, 2015; Kim & Thayne, 2015). Effective faculty follow up on students' progress and address challenges, which enhances the development of a learning community and contact in online environments (Beaudoin, 2002; Dennen, 2008; Garrison, 2009). Active instructor involvement improves learners' cognitive and social presence (Swan et al., 2008 & 2009), and their expertise boosts confidence in online platforms and transferable skills (Roblyer et al., 2010). Instructors must foster a blend of theoretical and practical experiences, manage resources, and structure activities effectively (Crawford-Ferre & Wiest, 2012; Keengwe & Kidd, 2010).

Instructor strategies are crucial for the success of e-learning, including curriculum design, course structure, group activities, timetables, guidelines, and technology use (Cheung & Lee, 2010). Developing social bonds among students enhances their sense of safety and openness in communication (Garrison et al., 2006). Effective communication in online learning involves timely and clear interactions through various formats, such as chat, email, and live class questions (Easton, 2003). Feedback and evaluation are vital, as the absence of timely feedback can demotivate students (Sher, 2009; Darabi et al., 2006). Group interactions and a sense of community are strongly related to performance in e-learning (Whipp & Lorentz, 2009). Maintaining effective online course interactions requires timely, specific, and clear feedback, challenging questions, online discussions, and weekly summaries (Whipp & Lorentz, 2009). Live classroom interactions through texting, video conferencing, and small peer groups also enhance learning. Instructors must continually follow up on students' progress and address learning issues promptly (Roblyer et al., 2010). Clear communication of deadlines and evaluation requirements contributes positively to learner engagement and content completion (Thistoll & Yates, 2016).

2.2.4 Learning Effectiveness in Higher Learning Institutions

The COVID-19 pandemic, which originated in Wuhan, China at the end of 2019, significantly disrupted higher education and technological businesses, causing widespread fatalities and suffering (Shereen et al., 2020). The pandemic led to the closure of face-to-face learning in approximately 120 countries, affecting millions of learners who had to return home due to lockdowns and curfews. As a result, higher learning institutions in developed countries adopted e-learning as an alternative, though it presented its own challenges (Azzi-Huck & Shmis, 2020; Shahzad et al., 2020a, b). In China, foreign students were either sent home or continued their studies online, but many experienced declines in academic performance and eye strain due to increased computer use (Azzi-Huck & Shmis, 2020; Shahzad et al., 2020a, b). The shift to technology-based education introduced tools like artificial intelligence, video conferencing, and various online resources, facilitating knowledge acquisition for students, administrative staff, and scholars (Di Vaio et al., 2020a). However, the effectiveness of e-learning in less developed countries was hindered by inadequate infrastructure, poor technology, unstable internet

connections, and limited ICT knowledge (Di Vaio et al., 2020a). In Rwanda, some institutions ceased operations during lockdowns, while others struggled with online teaching due to the lack of assessments until students could return to schools. Even when online teaching was possible, lecturers had to refresh content in face-to-face sessions before progressing (Young, 2006). Although many teachers and students appreciated online education, concerns about the quality and effectiveness of online teaching persisted (Sahu, 2020).

The sudden shift from traditional to online teaching highlighted infrastructural inadequacies, particularly in rural areas, exacerbating the challenges faced by both students and lecturers (Alvino et al., 2020; Di Vaio et al., 2020b). Students from poor and marginalized families found online learning prohibitively expensive and had to rely on self-teaching and offline methods. In Rwanda, many students, especially those from government-sponsored or middle-income families, struggled to access the internet and had to travel long distances to find connectivity (Sintema, 2020). Academic performance suffered due to reduced contact hours and the lack of consultation with teachers. Online assessments were marred by trial and error, uncertainty, and confusion among educators, students, and parents. The variability in online examination approaches further impacted student performance (Sintema, 2020). The effectiveness of learning during the COVID-19 pandemic in Rwanda remains a work in progress, with efforts ongoing to better meet students' and community needs in future pandemics.

3.0 Research Methodology

This study utilized a correlational research design. According to Kombo and Tromp (2006), descriptive research examines community systems such as schools. This research design was both accurate and appropriate for this project because it addressed educational matters within the social sciences. The target population included students, lecturers, and academic managers at the University of Rwanda's College of Agriculture, Animal Sciences and Veterinary Medicine (UR-CAVM), one of the six higher institutions comprising the University of Rwanda. The target population consisted of 1,993 students, 141 lecturers, and 27 academic managers, including one Principal, nine Heads of Departments, three Postgraduate Program Coordinators, four Deans, one Director of Teaching and Learning, one Director of Research, six E-learning Champions, one Director of ICT, and one Campus Registrar. Thus, the total target population was 2,161 people. Sampling is the process of selecting a subset of individuals from a study population to represent the entire group, as described by Bashir, Afzal, and Azeem (2008). This study adopted the Krejcie and Morgan (1970) sample size determination table to establish the sample size. According to this table, for a population of 2,161, a sample size of 327 was deemed sufficient to represent the larger population. The sample size was distributed into three categories, ensuring a representative cross-section of the target population.

4.0 The Research Findings

According to Bashir, Afzal & Azeem, M. (2008) a sample is a set of people who were chosen from the study population to represent all people. This study adopted Krejcie & Morgan (1970) sample size determination table to obtain the sample size. According to the Krejcie & Morgan table of sample size determination the population for 2161, and then sample size of 327 was selected to represent others. The sample size was distributed into 3 categories.

Table 1: Descriptive statistics for E-Learning Resource Availability

Statements	Mean	Std.
There is enough internet connectivity for online learning	4.15	1.05
Learning materials are available online	4.23	0.82
Students lack infrastructure (smartphone, laptops, Internet connection, etc.) required to access online classes	4.22	0.77
Online resources are only in form of texts and video which enable students to learn and access materials	4.24	0.80
Students learn through combined use of conventional face to face classroom approach and on-line (Blended learning)	4.24	0.94
There is enough internet connectivity for online learning	4.35	0.77
The internet connection is always open during the day and night.	4.23	0.78
This colleges have website which is accessible for every student	4.26	1.06
The college possesses free online and offline contents materials	4.29	0.79
The college possesses web connectivity which transmit information to the students and employees	4.35	0.78
Average	4.258	0.856

The results in Table 1 show that the majority of respondents strongly agreed on several aspects of e-learning resources during COVID-19. Key findings indicate that internet connectivity for online learning is adequate ($\mu=4.15$, $STD=1.05$), and learning materials are readily available online ($\mu=4.23$, $STD=0.82$). However, students face challenges due to the lack of necessary infrastructure such as smartphones, laptops, and reliable internet connections ($\mu=4.22$, $STD=0.77$). Online resources are available in text and video formats, which facilitate learning ($\mu=4.24$, $STD=0.80$). Additionally, students are using a blended learning approach that combines face-to-face and online methods ($\mu=4.24$, $STD=0.94$). The findings also highlight that the internet connection is reliable both day and night ($\mu=4.23$, $STD=0.78$), and the college website is accessible to all students ($\mu=4.26$, $STD=1.06$). Furthermore, the college offers free online and offline content materials ($\mu=4.29$, $STD=0.79$), and has web connectivity that effectively transmits information to students and employees ($\mu=4.35$, $STD=0.78$). Overall, the results indicate a high level of agreement on the positive impact of e-learning resources during COVID-19 on learning effectiveness in higher education institutions, with an overall mean agreement of 4.26 and a standard deviation of 0.86.

Research also indicates that a variety of e-learning platforms have been developed in response to challenges posed by COVID-19, with many higher education institutions adopting these platforms to meet students' educational needs (Wong, Wu & Li, 2008). However, the adoption of e-learning systems faces obstacles such as poor awareness, inadequate management support, limited funding, insufficient infrastructure, and inadequate training (Eze et al., 2018; Prause, 2019; Bukhari, 2010;

Markus and Robey, 1998; Bhuasiri et al., 2012; Allen and Seaman, 2003; Abdulhamid et al., 2017; Okundaye et al., 2019).

Table 2: Descriptive Statistics on Learning Effectiveness in Online Learning Courses During COVID-19 Period

Statement	Mean	Std. Deviation
Learner's academic performance in exams for online modules is good	4.27	0.85
Students' self-study skills have considerably improved due to e-learning	4.29	0.87
The student academic performance in online quizzes was satisfactory	4.38	0.79
Learners' academic performance in online assignments was good	4.27	0.91
Students get better marks in modules learnt online than in those taught using the traditional method	4.38	0.75
Students' attendance to online learning has increased amidst COVID-19 pandemic	4.34	0.76
Assignments and other academic tasks done online are submitted on time	4.56	0.78
Students attend online classes on time	4.39	0.77
Lecturers can easily monitor students' attendance due to online learning	3.80	1.10
Dropout cases have decreased due to online learning	4.03	0.94
Overall Mean	4.271	0.852

The results from Table 2 show that the majority of respondents strongly agreed on various aspects of online learning effectiveness during the COVID-19 period. Learner's academic performance in exams for online modules was good ($\mu=4.2700$, $STD=0.84942$), and students' self-study skills have considerably improved due to e-learning ($\mu=4.2938$, $STD=0.86931$). The performance in online quizzes ($\mu=4.3798$, $STD=0.78941$) and assignments ($\mu=4.2700$, $STD=0.90703$) was satisfactory, and students achieved better marks in online modules compared to traditional methods ($\mu=4.3798$, $STD=0.74678$). Attendance to online learning increased ($\mu=4.3353$, $STD=0.76203$), and assignments were submitted on time ($\mu=4.5638$, $STD=0.77705$). In addition, students attended online classes punctually ($\mu=4.3858$, $STD=0.77123$), and lecturers could easily monitor attendance ($\mu=3.8012$, $STD=1.10421$). Dropout cases decreased due to online learning ($\mu=4.0326$, $STD=0.94277$). Overall, the high mean ($\mu=4.2712$) and relatively low standard deviation ($STD=0.85192$) indicate a significant positive effect of e-learning resources on learning effectiveness in higher education during the pandemic.

Table 3: Regression Analysis

		Model Summary					
Model	R	R Square	Adjusted Square	R	Std. Error of the Estimate		
1	.851a	0.724	0.689		0.09019		
		ANOVA					
		Sum of Squares	df	Mean Square	F	Sig.	
1	Regression	0.17	1	0.17	20.948	.002b	
	Residual	0.065	8	0.008			
	Total	0.235	9				
		Coefficients					
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
1		B	Std. Error	Beta			
	(Constant)	5.414	2.121		-2.552	0.034	
	Learning Resources	2.28	0.498	0.851	4.577	0.002	

The regression analysis results demonstrate that the availability of e-learning resources during COVID-19 has a substantial effect on learning effectiveness, accounting for 72.4% of the variation as indicated by an R^2 of 0.724, making the model a strong predictor. The ANOVA results reveal that the significance of the F statistic is 0.002, which is less than 0.05, indicating a significant impact of e-learning resources on learning effectiveness in Rwandan public higher-learning institutions, thus rejecting the null hypothesis in favor of the alternative hypothesis. The coefficients further indicate a positive and significant effect, with the availability of e-learning resources during COVID-19 having a standardized coefficient (β) of 2.280 and a p-value of 0.002. This implies that each unit increase in the availability of e-learning resources enhances learning effectiveness by 2.280 units.

5.0 Conclusion

During the COVID-19 pandemic, online teaching appeared as an elixir for uninterrupted academic activities, allowing teachers and students to continue their work while remaining safe at home. Teachers from various levels of academic institutions, such as colleges and universities, had used vintage technology for academic purposes, regardless of gender. Though online teaching has been viewed as the best replacement for face-to-face didactic classes during the COVID-19 pandemic, it cannot completely replace traditional classroom teaching, not only in professional and practical courses, but also in other related subjects. Thus, in the post-COVID-19 era, a chimeric model of teaching involving face-to-face education supplemented by online teaching appears to be the future of the global educational system. Because online education is still in its early stages in the country, owing primarily to the COVID19 pandemic, there will be a pressing need to strengthen digital culture and infrastructure. In the future, the availability of digital educational resources and rising expectations from educational institutions may lead to curriculum transformation in line with emerging technologies, as well as restructuring of academic programs and learning itineraries as a result of online, open, and blended learning delivery models. Teachers would need to be trained on how to use online teaching tools so that they can feel comfortable providing education online.

Recommendations

Parents should be encouraged to create a technological environment at home for their children, as academic achievement is influenced by parental support. It is recommended that parents purchase electronic devices to expose their children to technology. The government should continue to support universities and HLIs in establishing quality infrastructure for effective eLearning use by both lecturers and students.

References

- Akbari, E., Eghtesad, S., & Simons, R. J. (2012). Students' attitudes towards the use of social networks for learning the English language. Paper presented at International Conference on ICT for Language Learning, Retrieved from
- Allen, I. Elaine, and Christopher A. Seaman. "Likert scales and data analyses." *Quality progress* 40.7 (2007): 64-65.
- Allen, J., Rowan, L., & Singh, P. (2020). Teaching and teacher education in the time of COVID-19.
- Ali, W. (2020). Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemics. *Higher education studies*, 10(3), 16-25.
- Alsabawy, A. Y., Cater-Steel, A., & Soar, J. (2013). IT infrastructure services as a requirement for e-learning system success. *Computers & Education*, 69, 431-451.
- Alabarch, P. G. (2005). Patterns in higher education development. *American higher education in the twenty-first century: Social, political, and economic challenges*, 2, 15-37.
- Applebee, A. C., McShane, K., Sheely, S. D., & Ellis, R. A. (2005). Balancing act: How can universities recognise the scholarly nature of e-learning development for university teachers. In *22nd ASCILITE conference (Brisbane, Queensland)*. http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/03_Applebee.pdf.
- Applebee, A. C., McShane, K., Sheely, S. D., & Ellis, R. A. (2005). Balancing act: How can universities recognise the scholarly nature of e-learning development for university teachers. In *22nd ASCILITE conference (Brisbane, Queensland)*. http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/03_Applebee.pdf. need for more e-learning space? The case of Nigeria. *Proceeding ascilite Auckland*.
- Zee, S. C., Awa, H. O., Okoye, J. C., Emecheta, B. C., & Anazodo, R. O. (2013). Determinant factors of information communication technology (ICT) adoption by government-owned universities in Nigeria: A qualitative approach. *Journal of Enterprise Information Management*.
- Fjermestad, J., Hiltz, S. R., & Zhang, Y. (2005). Effectiveness for students: Comparisons of "in-seat" and ALN courses. *Learning together online: Research on asynchronous learning networks*, 39-80.
- Garrison, D.R. (2009). Communities of inquiry in online learning. In *Encyclopedia of Distance Learning*, Second Edition. IGI Global.

- Gerbic, P., & Maher, M. (2008). Collaborative self-study supporting new technology: The Makara e-portfolio project. *Proceedings of ASCILITE Melbourne*, 320-324.
- Gung, S. O., & Ricketts, I. W. (2007). Facing the challenges of e-learning initiatives in African universities. *British Journal of Educational Technology*, 38(5), 896-906.
- Harriman, A., & Mtshali, N. G. (2018). Implementing e-learning in resource-constrained nursing education institutions in Rwanda. *Research and Reviews: Journal of Nursing and Health Sciences*, 4, 1-14.
- Holley, D., & Oliver, M. (2010). Student engagement and blended learning: Portraits of risk. *Computers & Education*, 54(3), 693-700.
- Crecy, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and psychological measurement*, 30(3), 607-610.
- Laisure, A. R., Davis, L., & Thievon, S. L. (2000). Comparison of student outcomes and preferences in a traditional vs. world wide web-based baccalaureate nursing research course.
- Lu, X., Zhao, G., & Jiang, J. (2012, August). Influential Factors of Blended Learning in Chinese Colleges: From the Perspective of Instructor's Acceptance and Students' Satisfaction. In *International Conference on Hybrid Learning* (pp. 186-197).
- Springer, Berlin, Heidelberg. Maag, M. M. (2006). Nursing students' attitudes toward technology: a national study. *Nurse educator*, 31(3), 112-118.
- Polanyi, O. N. (2018). Distance learning/e-learning conceptual level by business educators and business education students. *Nigerian Journal of Business Education (NIGJBED)*, 3(1), 293-300.
- Ølnes, S, Ubacht, J., & Janssen, M. (2017). Blockchain in government: Benefits and implications of distributed ledger technology for information sharing.
- Porter, W. W., Graham, C. R., Bodily, R. G., & Sandberg, D. S. (2016). A qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education. *The internet and Higher education*, 28, 17-27.
- Swan, K., Shea, P., Richardson, J., Ice, P., Garrison, D.R., Cleveland-Innes, M., & Arbaugh, J.B. (2008). Validating a measurement tool of presence in online communities of inquiry. *E-mentor*, 2(24), 1-12.
- Tshabalala, M., Ndeya-Ndereya, C., & van derMerwe, T. (2014). Implementing Blended Learning at a Developing University: Obstacles in the Way. *Electronic Journal of E-learning*, 12(1), 101-110.
- UNESCO (2020). Learning through radio and Television in the time of COVID-19. Retrieved UNESCO Institute for Information Technologies in Education (2002). *Information and Communication technologies usage in higher distance education in Sub-Saharan Africa: National and regional state-of-the-art and perspectives*. Moscow: UNESCO Institute for Information Technologies in Education (IITE).

- Van Jaarsveldt, L. C., & Wessels, J. S. (2015). Information technology competence in Undergraduate Public Administration curricula at South African universities. *International Review of Administrative Sciences*, 81(2), 412-429.
- Zhao, J., McConnell, D., & Jiang, Y. (2009). Teachers' conceptions of e-learning in Chinese Higher education: A phenomenographic analysis. *Campus-Wide Information Systems*.
- Zhao, Y., Lei, J., Yan, B., Lai, C., & Tan, S. (2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record*, 107(8), 1836-1884.