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AN EXPLORATORY STUDY OF ICT ADOPTION FOR E-LEARNING IN THE HIGHER INSTITUTIONS OF KOGI STATE

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A B S T R A C T

This study aimed at ICT adoption for e-learning in the higher institutions of Kogi State. The study adopted descriptive research design. The study's target population comprised of the Higher Institutions in Kogi State. Multistage random sampling technique was adopted. Data were gathered and analysed Multiple Regression and Principal Component Analysis. Finding revealed that ICT adoption for e-learning has significantly weak effect on the academic performance of students in the higher institutions of Kogi State. The study concluded that information technology is cardinal to improved performance. The study recommended that higher institutions should be adequately funded by the government to be able to cope with cost of IT subscription; users of e-learning technologies should be well trained in respect of the nature of technology in use; anxiety for e-learning should be minimized through constant orientations, and the perception of users towards the use e-learning technologies should be through seminars and programmes.

1. INTRODUCTION

In the immediate past, conventional method gained more adoption over modern method. Technology is at the core of modern method. The advent of global pandemic (COVID-19) has now forced the adoption of technology for works in Nigeria. Based on the traumatic experience in one on one contact in the academic environment, information technology now fills the vacuum created by the pandemic. The advent of technology to effective communication of information during the routine and non-routine academic task has provided a platform for better operation in the high institutions of learning in Kogi State.

The study is narrowed down to the higher institutions in Kogi State. This is because ICT promotes educational quality, and it is instrumental to improved academic performance. It supports data protection and reduced operation and administrative cost of higher institutions in Kogi State. Lawal-Solarin (2015) opined that high cost is associated with ICT training; thereby making it expensive for university to use ICT in Nigeria. Yemi-Peters et al. (2019) recognize the importance of ICTs, and emphasize on the need for training relative to its effective usage/ applications and maintenance.

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According to Adeoye et al. (2020), the global educational sector is changing toward e-learning in attempt to minimise the effects of the pandemic, and evidences from the Nigerian experience shows that schools are confronted with the obstacle of transitioning from conventional teaching to e-learning during the pandemic. It is also observed that there are some challenges facing the higher institutions in Kogi State with respect to ICT adoption for e-learning during this pandemic. The obstacles, according to Adeoye et al. (2020), come as a result of the Nigerian education sector's varying levels of readiness, lack of facilities, lack of funding, and policy issues. Some higher institutions in Kogi State have been facing the problem of efficiency, effectiveness and transparency due to these challenges. The fact remains that there is a gap in ICT adoption in the higher institutions of Kogi State. Lecturers may experience illumination in delivering lectures and assessment of students in Kogi State (either in the rural areas or urban areas). Through ICT, lecturers may monitor the students' learning history, and track their current academic condition at their residence. Most importantly, they may provide advisory service to students on learning matters, recommend study tools and provide examination on students.

However, the adoption of ICT for e-learning is expected to enhance the academic performance in the higher institutions of Kogi State. Basri et al. (2018) posited that ICT adoption has linear relationship with academic performance. ICT provide opportunity for students who have difficulty relating in the class to improve his/her academic performance. Also, lecturers can also boost their performance through the integration of ICT to learning in higher institutions in Kogi State (Orugun et al., 2019). Wide gap exists with respect to research on the adoption of ICT in the higher institutions of Kogi State. Thus, the specific objectives of the study were to:

1. Investigate the effect of ICT adoption (for e-learning) on the academic performance of students in the higher institutions of Kogi State.
2. Ascertain the challenges facing the higher institutions in Kogi State with respect to ICT adoption for e-learning.

2. LITERATURE REVIEW

Information and communication technology (ICT) has a nexus with the efficiency of higher institutions. According to Basri et al. (2018: 1), "ICT has become an important source of innovation and improvement of efficiency". The integration of ICT in educational system has already become a vital part of the learning process for high institution students both in and out of the school environment. Lawrence (2015) noted that it has become very crucial to the university management, lecturers and researchers. The higher institutions that have adopted ICT for e-learning has records of improved learning, impressive research outcome and

effective class teaching. Yang (2015) expressed that modern information technology has become an indispensable tool for service delivery today. It then becomes paramount to establish the conceptual definition of Information and Communication Technology for the purpose of this study.

ICT is an acronym for the information and communication technology. It is a concept used to collect, store, retrieve, process, evaluate and transmit information. Ibikunle (2008) described ICT as the convergence of microelectronics, computing and telecommunications, and that it includes technologies such as desktop and laptop computers, software and internet connectivity which are indented to accomplish information processing and communication (p.12). Jegede (2015) expressed that "ICT can be described as any tool that facilitates communication process and transmit information and shared knowledge through electronic means" (p. 422). In order to widen the understanding of ICT, Apulu and Ige (2011) defined it as any technology that enhances and promotes communication and information transmission through electronic methods. Desktop computers, laptops, mobile devices, wireless intranets, business productivity applications such as text editors and spreadsheets, enterprise's software, data storage and protection, network security, and so on are examples of these technologies (Ashrafi & Murtaza, 2008).

The concept 'E- Learning' implies electronic learning. Olson Kurt deMaagd et al. (2011) cited in Namisiko, et al. (2014) stated that "e- learning is a type of learning that uses electronic technologies to access educational curriculum outside the traditional classroom" (p.136). In most instances, this could be referred to as course, program or degree delivered entirely online. There are several other terms used to describe learning delivered online, via the Internet, ranging from distance learning, computerized electronic learning, online learning, e-resourcing, internet learning and many others. For the purpose of this study, e-learning is viewed as a learning process that is designed to make use of technology for teaching in and outside the classroom. There are varying platform for learning (ranging from whatsapp, zoom, webinar and video tape).

It could be interactive in the sense that a student can speak with his or her teachers, professors, or other classmates. It is often presented live electronically or through real-time interaction, and other times it is pre-recorded. The desire to e-learning optimizes the condition of management in order to restore contact hours across instructional parts, disengaged students and lecturers in order to account for falling educational rates and ratios (Namisiko et al., 2014; Roy et al., 2020). The merger of e-learning to lectures on elements of curriculum apart from step-down on learners due to individual differences, it cushions the physical unprecedented degeneration of lecturers in line and

course of duty to earn royalties. Still when officially off duty one can learn from the use of e-resource storage technology for some contact hours.

3. METHODOLOGY

The study adopted descriptive research design. Sekaran & Bougie (2013) noted that the rationale behind this adoption is to answer the what, how and why. The study's target population comprised of the Higher Institutions in Kogi State. This study was targeted at the Federal University Lokoja (186), Federal Polytechic Idah (838) and Kogi State University (364). The total population of the academic staff of the selected Higher Institutions in Kogi State was 1,388 (Directorate of Academic Planning and Academic Officer, 2019; education.gov.ng). For this study, given the population of 1,388 academic staff of the selected Higher Institutions in Kogi State, the research adopted Sallant and Dillman's (1997) method. The formula is stated below:

$$N_s = \frac{N_p \ (p)(1-p)}{(N_p - 1)\left(\frac{B}{C}\right)^2 + (p)(1-p)} \tag{1}$$

Where:
Ns= completed sample size required
Np= Sample population
P= proportion expected to answer in a certain way (50% or 0.5 is most conservative)
B= acceptable level of sampling error ($0.05 = \pm 5\%$; $0.03 = \pm 3\%$)
C= Z statistic associated with the confidence interval (1.645=90% confidence level; 1.960=95% confidence level; 2.576=99% confidence level)

$$\frac{1388(0.5)(1 - 0.5)}{(1388 - 1)(\frac{0.05}{1.645})^2 + (0.5)(1 - 0.5)} \tag{2}$$
$$= \ 226 \ approx.$$

The sample size of the study was 226. For this study, multistage random sampling technique was adopted. The Cronbach's alpha (α) was used to determine the multiple-item scale's reliability. Zikmund et al. (2010) consider 0.70 as critical point for reliability. The Cronbach result shows; ICT adoption for e-learning (α= 0.984), and academic performance (α= 0.967).

Data were gathered and analysed. Both descriptive and inferential analytical techniques were used for this purpose. The analytical techniques that were employed are basically Multiple Regression and Principal Component Analysis. The model is specified as:

APS = f (X$_1$….X$_n$) (3)
Where,
APS = Dependent variable (academic performance of students);

f = a function to be specified
X = a vector of explanatory variables that pertain to ICT adoption for e-learning

In specific form, equation (3) translates into equation 4 thus:
APS = a + β$_1$OS$_1$ + β$_2$PEU$_2$ + β$_3$NOT$_3$+ β$_4$AFE$_4$ + e (4)
Where,
a = Constant
COS = Cost Of Subscription
PEU = Perceived Ease of Use
NOT = Nature of Technology
AFE = Anxiety for E-Learning
β$_1$, β$_2$, β$_3$, β$_4$ are regression coefficients which determine the contribution of the independent variables
e = residual or stochastic term (which reveals the strength of β$_1$OS$_1$, β$_2$PEU$_2$, β$_3$NOT$_3$ & β$_4$AFE$_4$)

4. RESULTS AND DISCUSSIONS

This section shows the analysis of data with respect to the study's objectives.

4.1 Data Analysis and Results

Table 1 present the result on the predictive power of ICT adoption for e-learning over the academic performance of students in the higher institutions of Kogi State. It is observed that the ICT adoption for e-learning has predictive power below average (given the R^2= 0.414). This implies that 41.4% variation in the academic performance of students in the higher institutions of Kogi State is explained by the ICT adoption for e-learning. Other 58.6% unexplained variation depicts that there are numerous other variables that can explain the academic performance of students in the higher institutions of Kogi State.

Table 1. Regression on ICT adoption for e-learning and academic performance of students

Variables	Coefficients (β)	Std. Error	T-Stat	P-Value
(Constant)	4.263	.227	18.813	.000
Cost Of Subscription	.571	.283	2.020	.045
Nature of Technology	-.394	.183	-2.149	.033
Anxiety for E-Learning	.837	.253	3.311	.001
Perceived Ease of Use	-1.346	.285	-4.723	.000
Mean Square (Residual)	1.288			
F-Stat (p<.001)	38.954			
R Square	.414			

However, ICT adoption for e-learning has weak effect on the academic performance of students in the higher institutions of Kogi State.

Table 1 indicates that the regression model is adequately predicted by the dependent variable. The *F*-statistic (38.954) reflects a significant variance in the academic performance of students in the higher institutions of Kogi State (given that the sig < 0.05). This provides a very strong evidence of the need to reject the null hypotheses. The ANOVA table (having reported a significant *F*-statistic) also states that using the model is better off than guessing the mean. Thus, it shows a good fit for the data. The mean square residual value (1.288) is small. This shows less deviation between the observed and fitted value. The coefficient of determination (in table 1) for ICT adoption for e-learning ($R^2= 0.414$) proves a weak but significant effect on the academic performance of students in the higher institutions of Kogi State.

Table 1 shows that cost of subscription, nature of technology, anxiety for e-learning and perceived ease of use are the considerable elements in ICT adoption for e-learning. The table shows that a positive linear relationship surfaces between cost of subscription and the academic performance of students (given the $\beta= 0.571$; Sig-value= 0.045). This implies that 57.1% increase in cost of subscription will translate into increased academic performance of students in the higher institutions of Kogi State. Simply put, the academic performance of students will significantly improve having incurred higher cost on ICT for e-learning.

The table shows that a negative linear relationship exists between nature of technology and the academic performance of students (given the $\beta= -0.394$; Sig-value= 0.033). This means that 39.4% change in the nature of technology (in use for e-learning) will lead to about 39.4% decrease in the academic performance of students in the higher institutions of Kogi State. The implication of this is that the more the complexity in the nature of technology (in use for e-learning), the lower the tendency of improved academic performance of students in the higher institutions of Kogi State. It is however observed that nature of technology (in use for e-learning) has a significantly negative linear relationship with the academic performance of students in the higher institutions of Kogi State.

The table shows that a positive linear relationship exists between anxiety for e-learning and the academic performance of students (given the $\beta= 0.837$; Sig-value= 0.001). This implies that 83.7% increase in anxiety for e-learning will translate into proportional increase in the academic performance of students in the higher institutions of Kogi State. This may mean that the fear of how to handle ICT will make tutors to seek improved knowledge on e-learning, and this will translate into corresponding increase in the academic performance of students in the higher institutions of Kogi State. The result however proves that the positive linear relationship is a significant one; indicating that

anxiety for e-learning has a significant and positive linear relationship with the academic performance of students in the higher institutions of Kogi State.

The table shows that a negative linear relationship exists between perceived ease of use and the academic performance of students (given the $\beta= -1.346$; Sig-value= 0.001). The linear relationship is interesting above 100%. This implies that 134.6% change in the perceived ease of use (ICT for e-learning) will lead to proportional inverse change in the academic performance of students. This does not correlate with the nature of technology in use. It is depicted that the more the tutors perceive ease in the use of ICT, the lesser the academic performance of students in the higher institutions of Kogi State. This result may be associated with some factors not investigated in this present study. It is however noted that the negative linear relationship is significant.

The table 2 shows that the Bartlett's Test of Sphericity (p<0.01) and the Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy index (with the value of 0.517) confirms that the data fit in for the Principal Component Analysis (PCA). The KMO value of 0.517 is closer to 1, and it is believed to be a good one. Therefore, the KMO is considered important and sufficient enough. The simple implication of Bartlett's Test of Sphericity (p<0.01) is that the correlation matrix significantly varies from identity matrix (in which the correlation among variables is equal to zero).

Table 2. KMO and Bartlett's Test with respect to ICT adoption for e-learning

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.517
Bartlett's Test of Sphericity	Approx. Chi-Square	510.073
	Df	15
	Sig.	.000

Source: Field Survey (2021)

Table 3 indicates that the communalities analysis of variables (in which each of the variable has the value above 50%).

Table 3. Communalities analysis on challenges facing the higher institutions with respect to ICT adoption for e-learning

	Initial	Extraction
Low level of preparedness of the institutions	1.000	.936
Lack of infrastructures	1.000	.732
Limited bandwidth	1.000	.791
Lack of financial resources	1.000	.894
Inadequate human resource capacity	1.000	.665
Inadequate training	1.000	.758

Source: Field Survey (2021)

Communalities show the relationship between the variable and all other variables. For principal component extraction, the initial communalities value is

always equal to 1.0 for correlation analyses. Extraction communalities are estimate of the variance in each variable accounted for by the components. The table shows that communalities for low level of preparedness of the institutions (0.936), lack of infrastructures (0.732), limited bandwidth (0.791), lack of financial resources (0.894), inadequate human resource capacity (0.665), and inadequate training (0.758) are all important. In view of this, since the value are higher than 0.5 (50%), it is an evidence that the extracted components represent the variables well.

In table 4, the first factor (challenges facing the higher institutions with respect to ICT adoption for e-learning) has the eigenvalue of 2.427; the second factor has the eigenvalue of 1.321; and the third factor has the Eigenvalue value of 1.030. The values are equal or greater than 1, and this shows more variance.

Table 4. Total Variance Explained on variables on challenges facing the higher institutions with respect to ICT adoption for e-learning

Compo-nent	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.427	40.443	40.443	2.427	40.443	40.443
2	1.321	22.009	62.452	1.321	22.009	62.452
3	1.030	17.160	79.612	1.030	17.160	79.612
4	.691	11.517	91.129			
5	.429	7.157	98.286			
6	.103	1.714	100.000			

Source: Field Survey (2021)

The percent of the explained variance are 40.443; 22.009 and 17.160. Other factors ranging from 4 to 6 have Eigenvalue value which is less than 1. Therefore, they are explained as lesser variance.

Figure 1. Component plot on challenges facing the higher institutions with respect to ICT adoption for e-learning

Figure 1 shows the component plot on challenges facing the higher institutions with respect to ICT adoption for e-learning. The figure determines the optimal number of components. The components on the plot (above 0.0) are extracted. The other components below '0.0' are considered having less contribution to the challenges. Based on the eigenvalues, a three factor challenges will probably be adequate. This figure gives an elaboration on table 4. The figure shows that inadequate human resource capacity, lack of financial resources and low level of preparedness of the institutions are the three strong challenges facing the higher institutions with respect to ICT adoption for e-learning.

4.2 Discussion of Findings

Finding revealed that ICT adoption for e-learning has significantly weak effect on the academic performance of students in the higher institutions of Kogi State. This supports the assertion of Almadani (2018) that a link exists between ICT adoption and academic performance in a conservative environment.
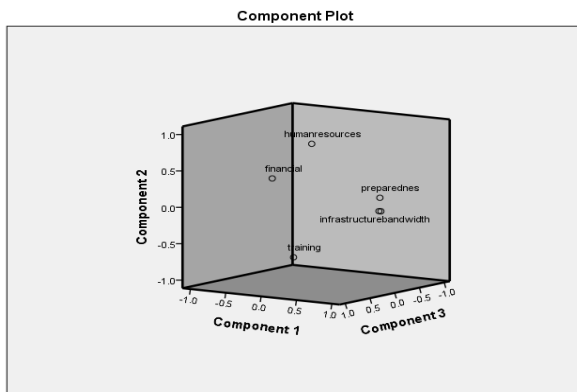
This present study conceived cost of subscription, nature of technology, anxiety for e-learning and perceived ease of use as the elements in ICT adoption for e-learning. It was found that cost of subscription has a positive linear relationship with the academic performance of students. This may mean that higher institutions that are highly funded may subscript to highly sophisticated technology for e-learning, and this will consequently lead to high academic performance of students. This advances the assertion of Liang and Xue (2009) that cost of subscription only influences adoption. The nature of technology has significantly negative linear relationship with the academic performance of students in the higher institutions of Kogi State. This study augment the assumption of Technological Frames of Reference Theory that nature of technology has more explanatory power over adoption and implementation of ICT. This may mean that the more the complexity in the nature of technology (in use for e-learning), the lower the tendency of improved academic performance of students in the higher institutions of Kogi State.

Finding revealed that a positive linear relationship exists between anxiety for e-learning and the academic performance of students in the higher institutions of Kogi State. This advances the assertion of Murgor (2015) that stress or anxiety felt by a student faced with the necessity of using computer in a learning or

performance context will affect the adoption of ICT. This could indicate that tutors will explore increased understanding on e-learning as a result of their anxiety of how to use ICT, and that students' academic performance in Kogi State's higher institutions will rise as a result. The linear relationship between perceived ease of use and the academic performance of students was found to be negative and significant. This advances the position of Gefen and Larsen (2017) that perceived ease of use can only influence the adoption of ICT. This study provides scientific back-up that the greater the ease with which tutors perceive the usage of ICT, the lower the academic performance of students at Kogi State's higher institutions. This finding is against the a-priori expectation of the study. There are uninvestigated factors that can account for such finding.

Finding shows that there are three major challenges facing the higher institutions with respect to ICT adoption for e-learning. The investigated challenges were low level of preparedness of the institutions (0.936), lack of infrastructures, limited bandwidth, lack of financial resources, inadequate human resource capacity, and inadequate training. These variables are in tandem with studies (such as Ejiaku, 2014; Nwachukwu & Pepple, 2015; Onu, 2015; Adeoye et al., 2020). It was found that inadequate human resource capacity, lack of financial resources and low level of preparedness of the institutions are the three strong challenges facing the higher institutions with respect to ICT adoption for e-learning. This study refutes the finding that poor communication infrastructure (Onu, 2015), and that lack of ICTs infrastructure (Nwachukwu & Pepple, 2015) are the major challenges facing the higher institutions with respect to ICT adoption for e-learning. The study however agrees with the finding of Nwachukwu and Pepple (2015) that inadequate ICTs funding is a significant challenge facing the higher institutions with respect to ICT adoption for e-learning.

5. CONCLUSION

E-learning has become inevitable for higher institutions today. The social health situation has necessitated the adoption of ICT for e-learning in the Nigerian Higher Institution of Learning. Information technology is seen to be cardinal to improved performance of higher institutions in Kogi State. There are empirical evidences that ICT is contributory to the success of e-learning. This study has been able to ascertain that ICT adoption for e-learning can bring about improved academic performance of students in the higher institutions of Kogi State. The illumination brought by e-learning technologies has translated into improved academic performance of students in the higher institutions of Kogi State.

There are numerous challenges facing the higher institutions with respect to ICT adoption for e-learning. This study is able to ascertain that three of these challenges have major implications. It was ascertained that inadequate human resource capacity, lack of financial resources and low level of preparedness of the institutions affect the higher institutions with respect to ICT adoption for e-learning.

The study recommended that:
- Higher institutions should be adequately funded by the government to be able to cope with cost of IT subscription; users of e-lerning technologies should be well trained in respect of the nature of technology in use; anxiety for e-learning should be minimized through constant orientations, and the perception of users towards the use e-learning technologies should be through seminars and programmes. Adherence to these will lead to strong effects of ICT adoption on the academic performance of students in the higher institutions of Kogi State.
- Higher institutions should address issues relative to inadequate human resource capacity, lack of financial resources and low level of preparedness. These are the three major challenges facing the higher institutions with respect to ICT adoption for e-learning.

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