INFORMATION TECHNOLOGY RESOURCES AND STUDENTS' ACADEMIC PERFORMANCE IN FEDERAL UNIVERSITIES IN NIGERIA.

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ABSTRACT
The aim of this study was to examine the impact of Information Technology resources on academic performance in Federal Universities in Nigeria. It specifically examined how e-learning, Computer-based tests, online registration and Web Portal services of Universities impact on their academic performance. In examining academic performance, the work drew on Firdaus Abdullah's modified HEdPERF specifically used in measuring higher education performance, and came up with the construct academic performance by merging academic and non-academic effects. The research adopted the survey aspect of quasi-experimental design. Using questionnaire, primary data were collected from 300 senior administrative staff representing 12 federal universities in the South-south zone in Nigeria. The Regression Analysis was used in testing the composite effect of information technology resources on academic performance in Federal Universities. The study found that an optimal combination of information technology resources could improve academic performance in universities by as much as 70%, and the resultant improvement in customer satisfaction is predictable. We, therefore, suggest that these federal universities can increase customer value by upgrading their various IT resources for better service and customer satisfaction.

Introduction

Information Technology has revolutionized the world; it has affected the way societies operate their businesses, learn, train and even entertain. It is essential to have complete grasp of how critical information technology (IT) is in driving and shaping societies today, and in determining its future. Of particular note is the importance of Information Technology (IT) in achieving quality education, as echoed by Annan (2005) in the following words:

One of the Millennium Development Goals (MDGs) is the achievement of Universal Primary Education by 2015. We must ensure that Information and Communication Technology (ICTs) are used to help unlock the door to Education.

Education on the other hand is fundamental to the development of a dynamic "work force capable of accessing and integrating knowledge into social and economic activities and participating in today's global economy" (World Bank Report, 2003). OECD (1996) refers to these as the "knowledge-based economy" which acknowledges the role of knowledge and technology in the global economy.

There is rising concern on how Information Technology Resources can help achieve high quality Education, creation of wealth, poverty alleviation, job creation and global competitiveness (Nwabueze and Ozioko, 2011). Information Technology is generally

used to improve productivity through improved service quality, cost efficiency, revenue effectiveness and capacity utilization (Kowalkowski, 2008). Education especially, at the tertiary level, has long been linked to marketable services (Rasul and Sahu, 2011).

However, there is obviously greater number of people in academics that find it difficult to access information or communicate same in tertiary institutions such as those in the South South Zone of Nigeria. No doubt, this can constitute some impediment to effective knowledge transfer and human development. This results in abysmal performance in the academic work and educational advancement. It is apparent that IT service resources in the South South Universities do not properly support academic pursuit. Is it possible that these Universities have inadequate or failing web portal services? One is in doubt if these Universities are equipped with modern e-learning facilities. We are inclined to believe that their computer-based tests do not involve modern technology applications. To ascertain if academic work in these Universities is supported with adequate IT resources we developed the interest to investigate the Information technology resources of federal universities in the South South Zone of Nigeria and how they fare in enhancing academic performance.

Theoretical Foundation and Hypotheses

This study is based on the Resource-Based Theory which "emphasizes the role of an organization's resources as a foundation" for its strategy. The Theory explores the relationships between resources, capabilities, competition and profitability (David, 1988). Grant (1991), in examining the Resource-based theory, relates resources with the appropriateness of returns on innovation such as technology. We concur that Information Technology resources can be used to impact academic work positively.

Information Technology Resources

Patil (2009) explains that the concept of information is associated with knowledge derived from study, experience or instruction. This can otherwise be interpreted by saying knowledge can be acquired through education. Technology on the other hand, he argues refers to the application of knowledge to practical aims of human life or to changing and manipulating the human environment. Information technology has been defined as "the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hard ware" (ITAA, 2005).

Cook (2008) in explaining information technology resource advocated a four-category classification model namely: of communication, co-operation, collaboration and connections. **Communication** refers to platforms that allow people to converse with others, either by text, image, voice or video or a combination of these. **Co-operation** describes showing software which enables people to share contents in structured and unstructured ways. While **Collaboration** is a focus on tools that encourage people in organizations to work with each other to solve problems. Furthermore, **Connections** involves networking technologies that make connections between people and content possible. These explain how information technology resources are used to foster communication, co-operation, collaboration and connections between individual and organization and vice versa.

Generally, the measures of information technology resource in various sectors such as banks have focused on dimensions such as the effect of the Internet, Automatic Teller Machines (ATMs) and mobile phones on service quality (Ombati et al, 2010). In their study, they concluded that the use of technology enhances service quality and also that customer service expectations vary with

their level of experience in IT use and education.

Therefore, our dimensions of information technology resources in schools in this study are the adoption and use of e-learning, e-registration/payments, computer-bases tests (CBT) and the existence of web portal services (Figure 2.1). These are the most common IT resources adopted and used in Knowledge generation and transfer in these federal universities.

The Concept of Academic Performance

Cretsinger (2003) believes that academic competition is impacting the students in all educational systems at all levels. This brings about pressure in three different areas of focus namely:

a) Real competition, that is, the competition between peers
b) Perceived competition, that is, the competition a person believes is occurring between themselves and others
c) Self competition, that is, the way a person continuously pressures himself to become better than others.

According to Cretsinger (2003), the pressure to succeed academically has made students commit academic dishonesty. The focus of this study is to examine the extent to which the available Information Technology Resources in the South South Universities in Nigeria impact on student's academic performance. Academic performance is the outcome of education. It is the extent to which a student has achieved their educational goals.

A number of more technologically advanced economies have developed ways of measuring academic performance. The State of California in United States of America uses the Academic Performance Index (API),in which it identifies individual differences and parents academic socialization as major factors influencing students' academic performance (en.wikipedia.org).

Firdaus (2005) , while relating service quality to higher education, states that students' experience in a tertiary educational institution should be a key indicator of their academic performance. Therefore critical factors of service quality of IT resources should be determined from the standpoint of providing students with greater value, as they are the primary customers. To achieve this he proposed the HEdPERF (Higher Education Performance-only) which is a performance-based measuring instrument that attempts to capture the authentic determinants of services quality within higher education sector.

However, to ensure more accuracy of measurement, Firdaus (2005) came up with a modified HEdPERF dimensions which are academic aspects, non-academic aspects, reliability and empathy. The above modified HEdPERF scale provides the basis for the fusion of the first two dimensions (academic aspects and non-academic aspects) in the modified HEdPERF scale to produce the construct- Academic Performance for this study.

Information Technology Resources and Academic Performance

No doubt Information Technology Resources are essential in teaching and learning. Several studies have been carried out in the area of information technology adoption, diffusion and usage. These studies have also cut across a wide variety of areas and industries. These include information technology adoption in Academic Health Centers (Ash, 1997) and Information Technology application in Emerging Economies (Qureshi and Vogel, 2005). Awa *et al* (2012) reviewed some constructs of various adoption and diffusion models and proposed a model involving constructs such as company mission, individual difference factors, perceived trust, and perceived service quality for improving existing knowledge on electronic commerce acceptance and bases for informed decisions.

Leidner and Jarvenpaa (1995) examined the pedagogical assumptions underlying the design of information technology for educational purposes and related these assumptions to different models of learning, and found out that ICT is primarily used to automate the information delivery function in classrooms. This facilitates knowledge creation and transfer.

Van Dusen (1997) joined in calling for the use of information technology resources in providing expanded higher education opportunities to a very wide spectrum of present and potential clientele. Rasul and Sahu (2011) examined the use of IT and its impact on service quality in an academic library. They aver that the application and accessibility of IT facilitates the free flow of information, creative expression and effective management. They described library service quality as the difference between user expectations and perceptions of service performance. Their findings showed that the overall assessment of service quality and user satisfaction is moderate while the adequacy of print resource, electronic resources and IT service were particularly low.

Iwasokun *et al* (2012) statistically evaluated the impact of ICT on Nigerian Universities by analyzing four factors namely communication and feedback, study aid, processing and administration as well as management and relationships. However, they did not involve the impact of ICT resources on assessing and grading students as well as adequacy of the university curriculum on ICT based courses on students' academic performance in their investigation. This study focuses on making a contribution from this perspective.

In this study, we strive to fill the gap by specifically identifying how information technology application and usage affect academic performance in higher educational Institutions. The Information Technology Resources we are focusing on are Web Portal Services, E-registration, E-registration/payment, E-learning and Computer-Based Tests.

Web Portal Services and Academic Performance

A web portal is a website that brings information together from diverse sources in a uniform way. Apart from the standard search engines feature, web portal offers other service such as e-mail, news, information, databases and entertainment (www.en.wikipedia.org).Ivan Vuljak (2012) adds that Internet Portals can be seen as gateways to information and services provided on the web. He further identified Internet Portal properties to include Mission, Depth of content and Target users. He further splits portals into two groups namely Transaction-Based Internet Portals (for making profit) and the Information-Based Portals (for disseminating information).

Interestingly, Ivan Vuljak (2012) examined measurements for Information-based Portal service and found out that customers are most satisfied with the quality of information provided on Faculty/University Web Portals, and are least satisfied with web designs. To highlight the growing importance of Web Portal Services, the National Universities Commission (NUC) and other International Bodies involved in tertiary education have come up with the webometrics of universities across the world which provides a comprehensive ranking of these institutions in terms of their web activities and its impact in the running and administration of universities (www.nuc.edu.ng). This study, however, focuses on the impact of the Web Portal Service on students' academic performance, thus, we hypothesize as follows:

Ho_1: There is no significant relationship between Web Portal Services and academic performance in Universities

E-Registration/Payments and Academic Performance

Amaral (2007) reveals that in the academic world, quality assessment has traditionally assumed two major objectives namely quality improvement and accountability. Universities mostly strive for quality improvement in terms of academic and administrative service delivery. However, governments and regulatory bodies pay special attention to accountability which focuses on providing quality service to consumers.

E-registration/payments which is also referred to as on-line registration/payments were developed consequent upon the need to minimize paper-based transactions and to achieve greater accuracy of operations (Djoleto, 2008). His work found out that the use of e-business solutions such as e-payments and registration led to increased enrolments, efficiency (i.e., reduction of paperwork), and efficiency in tuition and bills payments as well as flexibility in events scheduling. Kalakota and Robinson (2000) cited in Djoleto (2008) defined e-registration/payment as the execution of transactions between two or more parties using interconnected networks

Also, Adeyegbe (2010), while accessing the e-registration in the education institutions, argues that Information Technology promises immense effectiveness and efficiency in teaching and learning. He observes that information Technology has been usefully applied to streamline the educational testing process in the following areas: Registration Data capture, Item banking and analysis, online assessment (Computerized Test Administration), Electronic marking and Results checking/verification. The benefits of e-registration include but not limited to enabling students register from any location, enhancing the efficiency of data captures and saving time, minimizing error and allowing long periods of registration, cost effectiveness and self sustenance. In all, e-registration adds value to academic services and increased yields to stakeholders.

In addition, Strauss (2000) cited in Olasina (2007) maintains that electronic registration, e-registration, web based registration or even online registration is a secure web site that students enter to indicate that they will attend classes in the upcoming session. Many of the federal universities are quickly recognizing, adopting and using this platform, hence we hypothesize as follows:

Ho_2: There is no significant relationship between e-registration/payments and academic performance in Universities

E-Learning and Academic Performance

Organization for Economic Cooperation and Development, OECD (2005) defines e-learning as the use of information and communication technology (ICT) to enhance and/or support learning. Barker (2002) describes the term e-learning as using both a computer and the Internet to learn. The document comprehensively describes the quality framework for e-learning in Canada in terms of Quality outcome from e-learning product and services, Quality processes and practices of e-learning products and services as well as Quality input and resources for e-learning products and services.

Oliver (2005) cited in the TDU (2012) quality framework for e-learning explain the "quality agenda" in the following terms.

"As more and more universities seek to use e-learning as a mode of delivery for their units and courses and as more and more they are being held accountable for the quality of the service they provide, the need grows for accepted standard and benchmarks against which performance can be judged".

OECD (2005) in a policy brief on e-learning in tertiary education asserted that e-learning is becoming increasingly prominent in tertiary education, with universities increasing provision and more students signing up. The TDU (2012) outlines 3 basic e-learning frameworks which consist of Basic standard (which consists of organization and appearance, consistency and compliance, appropriate use of tools, and learning

resources and supports), Staff development Tool kit and Advance standards. E-learning is changing teaching and learning. We are inclined to believe, therefore, that e-learning can be used to improve academic performance, hence we hypothesize as follows:

Ho_3: There is no significant relationship between e-learning and academic performance in Universities in South South Nigeria.

Computer-Based Tests (CBT) and Academic Performance

Alabi (2012) asserts that ICT focuses, specifically, on the application of new technologies in an educational context and serves as a tool for supporting the various components of education. Computer-Based Testing, Computers-Based Assessment or E-Exam is one specific form of ICT for learning assessment and it is a method of administering tests in which the responses are electronically recorded, assessed or both (Wikipedia, 2013). Individuals can take Computer-Based Tests (CBT) even with minimal or no previous computer experience.

A Computer-Based Tests (CBT) can either be linear or adoptive. The linear test is a full-length examination in which the computer selects different questions for individuals without considering their performance level. An adoptive test is one in which the computer selects the range of questions based on an individual's performance level.

Again, Friedrich (2008) cited in Alabi *et al* (2012) notes that Computer-Based Test enables educators and trainers to authors, schedule, deliver and report on surveys, quizzes, tests and examinations. The Computer-Based Test takes care of other related activities that interact with the assessment such as test administration, setting examination questions and automated marketing. Research outcomes have supported the fact that when students are motivated and testing conditions are equivalent there are no differences between the scores obtained via computer-based or paper-pencil tests (Alabi *et al* 2012).

Tella and Bashorun (2012) cited in Alabi *et al* (2012) found out that students have positive attitude towards Computer-Based Test, and established a strong perception that a Computer-Based Test increases students' performance in learning. Some of the benefits derived from Computer-Based Test for examinations include objectivity and security of testing, improvement in admission process, and use of archival databank of admitted candidates. Also, Clarianna and Wallace (2002) conclude that higher attaining students benefited most when it is computer-based assessment relative to when it is paper-based testing. They, however, found that gender, competitiveness and computer familiarity were not related to this performance difference.

In addition, Luecht and Sireci (2011) suggest that early research on Computer-Based Test almost exclusively focused on theoretical issues such as improving measurement efficiency by achieving adequate levels of test score reliability using as few items as possible. In order, to define its contribution to service quality, Computer-Based Test models are further evaluated in terms of the degree and nature of test adaptation, size and flexible units of test administration, user interface issues, automated test assembly and test form quality control and, security risks .These are all measures of the quality of the Computer-Based Tests. Again there are costs/benefit related metrics of evaluating various Computer-Based Test models. These are Parsimony which refers to the simplicity in design, implementation and maintenance, system performance, measurement efficiency, provision for quality control and assurance.

Moreover, Schevemann & Bjornsson, (2009) observe that technological innovation and new requirements posed by the global economy are affecting the performance of educational systems to a large extent. These days

competence, that is, skill, knowledge, and behaviour assessment is taking more objective form as policy- makers are asking for more accurate measures of the current level of their citizens competences and for ways of monitoring, analyzing, and reporting changes. Organizations want to know about the skills, knowledge and behaviour of their employees for staff development purposes or hiring needs in response to environmental dynamics. In educational practice, more emphasis is given to this assessment. ICT has provided new possibilities for assessing learning processes and outcomes. Also Computer-Based Test enables the learner to monitor his state of learning and progress. From these reviews, we have little or no doubt that Computer-based tests can affect academic performance. This makes us to hypothesize thus:

Ho_4: There is no significant relationship between Computer Based Tests and academic performance in Universities in South South Nigeria.

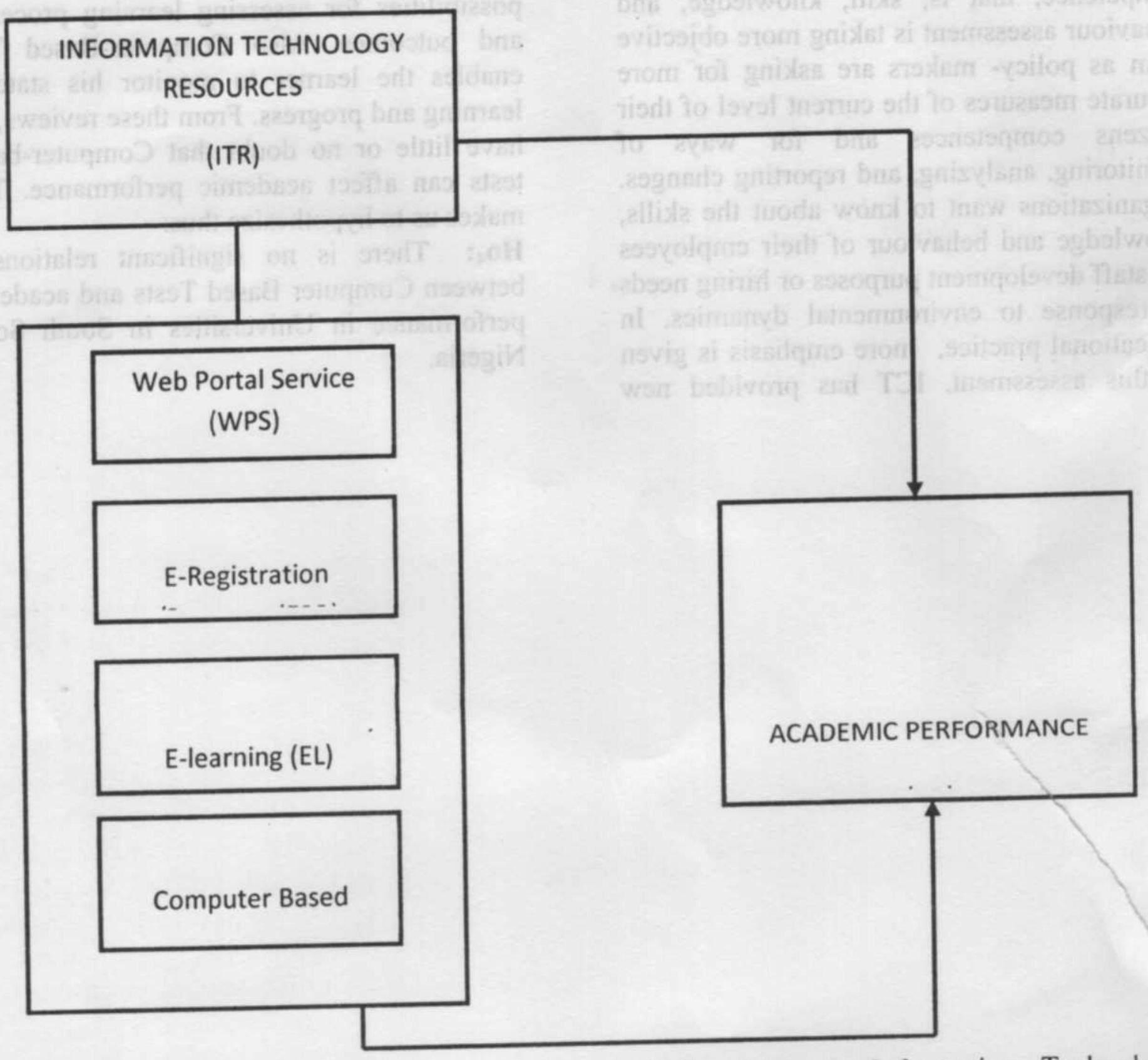

Figure 2.1: Conceptual Framework of the Association between Information Technology Resources and Academic Performance.
Source: Researchers' Conceptualization from Review of Related Literature, 2014

Methodology

The study adopted the cross sectional survey aspect of the quasi-experimental design and collected primary data through a structured questionnaire distributed to 300 members of Senate across 12 federal Universities in the South South zone of Nigeria. In order to ascertain the validity, the questionnaire was subjected to supervisor review and also exposed to senior administrative officers in the Faculty of Management Sciences of the University of Port Harcourt in a pilot survey and necessary adjustments were made, the final draft was distributed to senior management staff of the South-South Federal Universities in Nigeria.

In terms of reliability of the measurement items, Cronbach's Alpha co-efficient test was used to check for internal consistency. The rule of thumb in the use of these tests is that the Alpha values should not be less than 0.7. Therefore, a value of 0.7 and above indicates that the items in the measurement instrument are internally related to the factors they are expected to measure. Our Cronbach's Alpha co-efficient tests showed our model to be reliable at .902, thereby permitting us to

proceed with data collection and analyses which we used correlation and regression statistics to accomplish.

Analyses

In an attempt to determine the effects of the various measures of information technology resources on academic performance in higher institutions, a simple regression analysis was carried out resulting in four models as earlier identified and shown below

Strong Positive Relationship between Web Portal Services and Academic Performance.

One of the objectives of this study was to determine the extent to which Web portal, an ICT application, affects academic performance in the South South zone Universities in Nigeria. The results of our analyses (Table 3.1) reveal that R^2=0 .904, indicating that 90.4 percent of variances in students' academic performance is accounted for by Web Portal Services provided in these educational institutions.

Also, WPS |t| is the absolute value of the regression model intercept, which must be less than $\alpha/2$, 2-tailed for the null hypothesis to be accepted. However, the analysis shows WPS |t| =5.311, which is far greater than $\alpha/2$ = 0.05/2 = 0.025, 2-tailed.

Also, the p-value, (level of significance), must be greater than $\alpha/2$, that is, 0.05/2 =0.025 for the null hypotheses to be accepted. But the analysis shows a ρ-value 0.013, which is less than 0.05/2 =0.025. Again β_1 which is the unstandardized coefficient β of Web Portal Services must be less than zero for the null hypothesis to be accepted. However, the analysis shows a β_1 value of 0.691, which is greater than zero.

Since, WPS |t|= 5.311 (which is greater than $\alpha/2$, 2 tailed), with a ρ-value of 0.013 (less than $\alpha/2$), β_1= 0.691 (which is greater than zero), and R^2= 0.904, we have ample evidence to accept the alternate hypothesis (Ha_1), that there is a significant positive relationship between Web Portal Service and academic performance of students in the South-South Universities in Nigeria. With the results of the regression analysis (Table 3.1), we develop our first regression model thus.

AP_1= 17.69+0.69WPS+e..... .. Model 1

(e= an error term)

Strong Positive Relationship between E-registration/payment and academic performance.

Another objective of this study was to ascertain the extent to which e-registration/payments (ERP), an ICT resource, influences students' academic performance in South-South Universities in Nigeria. The results of primary data analyses (Tables 3.1) shows that R^2= 0.987, ERP |t|= 15.062, with ρ-value of 0.001, and β_2= 1.066. These results thus provide us with sufficient evidence to accept the alternative hypothesis (Ha_2), that there is a significant positive relationship between e-registration/ payment and students' academic performance in South-South, Nigeria. These results lead us to develop our second regression model, thus:

AP_2= 3.791+1.07ERP+e..... .....Model 2.

Strong Negative Relationship between E-learning and Academic Performance.

The third objective of this study was to know the extent to which e-learning (EL) an ICT application, affects academic performance of students in South-South Universities in Nigeria. Our data analyses results (Table 3.1) indicate that R^2= 0.255, EL |t| = -1.014, with a ρ-value of .0385, and β_3 = -0.456. With these results we have enough empirical evidence to accept the alternate hypothesis (Ha_3), that there is a significant negative relationship between e-learning and academic performance. That is to say as e-learning increases in these universities, academic

performance drops. These results lead us to developing our third regression model, thus:

$AP_3 = 83.3 - 4.56EL + e$ .....Model 3.

Significant Negative Relationship between Computer-based Test and Academic Performance

The fourth objective of this empirical investigation was to determine the extent to which Computer-based test (CBT), an ICT resource, influences academic performance of university students in the South-South part of Nigeria. The data analyses results (Table 3.1) reveal that $R^2 = 0.413$, CBT $|t| = -1.453$, with a ρ-value of 0.242, and $\beta_4 = -1.448$. These results provide us with ample empirical evidence to accept the alternate hypothesis (Ha_4), that there is a significant negative relationship between Computer-based test and academic performance. With these results we develop our fourth regression model thus:

$AP_4 = 140 - 1.45CBT + e$ ..... Model 4

TABLE 3.1: Regression Analysis of IT Resources and Academic Performance.

Hypotheses	Unstandardized coefficients		Standardized coefficients	t	(p) Sig	95% confidence Interval for B		R	R^2
	B	Std Error	Beta			Lower Bound	Upper Bound		
Ho_1 (Constant)	17.688	10.150		1.743	.180	-14.614	49.990		
WPS (Web Portal service)	.691	.130	.951	5.311	.013	.277	1.105	.951	.904
Ho_2 (Constant)	-3.791	5.355		-.708	.530	-20.833	-0.833		
ERP (E-Registration Payment)	1.066	.071	.993	15.062	.001	.841	1.292	.976	.987
Ho_3 (Constant)	83.301	35.951		2.317	.103	-31.109	197.712		
EL (E-Learning)	-.456	.450	-.505	-1,014	.385	-1.889	.976	.505	.255
Ho_4 (Constant)	140.004	63.997		2.188	.117	-63.663	343.672		
CBT (Computer Based Tests)	-1.448	.996	-.643	-1.453	.242	-4.618	1.723	.643	.413

Dependent Variables = Academic Performance

Independent Variables = WPS, ERP, EL and CBT.

Source: SPSS regression Analysis Results,2014.

3.2 Discussions, Conclusions and Recommendations

Our findings reveal that Web Portal Services significantly improves academic performance in Federal Universities in South-South, Nigeria. Rasul and Sahu (2011) had previously identified service quality (which is measured here with academic performance), as directly leading to higher customer satisfaction in universities. Several previous research have found that information technology provision and intensity can lead to higher growth in productivity and profit(Sappraseif, 2006), improved hotel performance and service delivery(Yousaf and Steene,2011), as well as enhance the quality of service even in the construction industry in Nigeria (Musa et al, 2010). We, therefore, conclude that Web Portal Services affect students' academic performance in Federal Universities in South-South, Nigeria.

E-Registration/Payment was also found to have significant and positive relationship with academic performance in federal universities in Nigeria. This confirms Adeyegbe (2010) assertions that e-registration holds an immense effectiveness and efficiency in streamlining testing processes and could lead to what Obriki (2012) described as an ideal academic environment where graduate students and undergraduates are given efficient services to enable them build a positive mindset which will help them intervene and contribute to national growth and development. Hence, we conclude that e-registration/payment affects academic performance in South-South Universities in Nigeria.

However, E-learning and Computer-Based Tests (CBT) were found to have a significant but negative relationship with academic performance. This can be explained by the result of the analysis of our respondents which showed that top academic and non-academic staff in universities are slightly deficient in the area of Information Technology usage and familiarity (i.e., IT compliance) as they were found to be just above average in the use of Information Technology tools. Kuncel *et al* (2004) also carried out a research to establish if general cognitive ability was a correct measure for predicting academic performance and job performance. Their findings, however, contradicted the notion that intelligence at work is wholly different from intelligence at school thereby extending the volumes of literature that support the broad importance of general cognitive ability.

Various previous researchers have looked at service quality across a variety of service contexts. The pioneering works of Parasuraman, Zeithaml and Berry (1985) has always been the springboard for such works across various industries. However, this study has examined academic performance (a measure of service quality in higher institutions) as a marketing objective while drawing on Firdaus Abdulla's Modified HEdPERF to come up with a unique construct of service quality in higher education – Academic Performance.

Public Universities management should therefore pay particular attention to its Web Portal Services and e-registration/payments as the study revealed a very strong impact on students' academic performance. Issues such as ease and speed of use, privacy, responsiveness and reliability of websites should be of paramount concern in this regard. The study provides ample evidence of the composite effect of Information Technology in improving academic performance in higher institutions. Universities are therefore advised to optimize these various IT resources to achieve desired results.

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