Contents and Architecture of Nigerian Universities' Websites

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Abstract

The study adopted information needs analysis theory to carry out analysis of the content of websites of 50 Nigerian universities. Two broad categories of possible website contents-official and everyday life information contents were identified and analyzed. It also adopted the Watson Addy Web Architecture test to carry out architecture analysis of the websites in the following areas: language syntax, style, spelling accuracy, down speed, file types and search engine compatibility using meta tag availability. The study was motivated by the growing interest of researchers in the role website content and architecture play in achieving high web usability. The findings exposed salient weaknesses like wrong domain name adoption, errors in syntax, poor style, spelling mistakes and non-availability of meta tags in the websites. In addition, the websites did not contain most of the official and everyday information expected to be in a university website. Based on the outcome of the study, Nigerian universities' websites can be generally categorized as having meager content and defective architecture. The paper presents recommendations for the improvement of contents and architecture of the websites.

Keywords: Website architecture analysis, website content analysis, university websites, Nigeria.

Introduction

The ability of websites to integrate various technologies and applications software have resulted in their use for information delivery services. Research has identified the desire of many organizations, including universities, to use their websites for so many information delivery functions as a primary factor that affects the usability of their websites (Duncan and Holliday, 2008, Ginige and Murugesan, 2001 and Constantine and Lockwood, 2001). Website architecture factors that may affect website usability include screen length, number of colours and images, fonts and availability of meta tags for site description and site keywords, among others (Yoo and Jin, 2004; Ling and Schaik, 2006). Most organizations tend to create and display such a variety of content as a way of maximizing their communication potential with their stakeholders. However, if this is not done properly, it makes browsing through such websites more complex than it should be.

Various attempts in the literature geared towards studying how organizations deploy their websites have presented a

platform for the categorization of university websites. For instance, Yoo and Jin (2004) wrote about top websites, that is, well designed websites with appropriate contents size and architecture. Zeng, Salvendy and Zhang (2009) wrote on website creativity and its impact on user behaviour, Constantine and Lockwood (2001) wrote on user-centered web engineering, while Ling and Schaik (2006) considered the effects of font type and line length. Utulu (2008), Onyancha and Ocholla (2007) and Agarin and Nwagwu (2005) wrote about web links. These studies can be adopted for the categorization of university websites:

- those with appropriate (relevant) and required amount of content
- those with inappropriate (irrelevant) and meager or excessive content
- those that are well designed (good) architecture and can be easily used to retrieve information
- those that are not well designed (defective) architecture and cannot be easily used to retrieve information
- those that receive high numbers of links from other websites as a result of their appropriate and relevant content and those that do not, as a result of inappropriate and irrelevant content.

The categorization mirrors web content and architecture challenges which have led to the growth of the literature on web usability. Much research has been done in this regard in Europe and America, with efforts being intensified in the Pacific and Asia. Unfortunately, researches on the use of websites by African universities, including those in Nigeria, are meager and have resulted in very little understanding among African universities on how to develop and use their websites for contemporary information delivery services such as communicating their mission and vision, academic programs, and services and activities, or creating open access to lecture notes, reports, research output, handbooks, etc. This has become more complex because of African universities' attempts to use their websites for new information delivery initiatives that are currently being adopted by universities around the world.

The main objective of this paper is to report the results of a study carried out to assess the contents and architecture of Nigerian universities' websites as determinant factors of their usability. This study is significant, not only because of the importance of websites as primary contact points for website users, but also because of the important role relevant web content and appropriate architecture play in meeting users' information needs in contemporary times.

Addressing Web Contents Using Information Needs Theory

The literature has proposed a number of factors that may be used to assess website architecture, including HTML size, download time, image size, number of images, homepage size, number and sizes of fonts, navigation tools, number of colours and screen length (e.g. AlHeyasat, 2005; Yoo and Jin, 2004). However, only web link (citation) research has been formalized and used to measure the relevance of website content. It is not clear if the literature has established any other definite method for assessing web content beyond the initial efforts of Dumont and Frindte (2005) and Liu (2008). It may be contended that website users' primary aim is to get relevant content, while good architecture is used to help users to navigate through web content. This makes website content analysis crucial. However, the limited research on website content evaluation in the literature may be understandable, as there are no formal specifications as to what should constitute the contents of websites.

Since websites have been described as analogue of books in web link and citation research (Smith, 2004); it follows that website contents can also be evaluated for their quality and relevance in the same way as book contents are evaluated in citation and collection management us-

ing users' information needs as the yardstick. Vallimtjana and Sabate (2008) and Knight-Davis and Sung (2009) described how citation analysis can be used for content analysis and to evaluate the impact of academic works. Blacke and Schleper (2004) and Ibekwe-SanJuan (2005) offered insights into how both superficial and indepth content analyses can be carried out on books and journals to ascertain their coverage, quality and relevance and the extent to which they can meet users' information needs. Dumont and Frindte's (2005) work on the contents of home pages of websites owned by psychologists is a typical example of web content analysis using users' information needs to determine the relevance of web content.

The literature on information needs can thus be adopted to develop a framework for research on website content. Research on information needs has established that people's status, social involvements, assignments, economic and health needs determine the situations that arise in the course of their lives and what they need to ease, resolve and address such situations (Dutta, 2009; Beautyman and Shenton, 2009; Shenton, 2007; Petric, 2006; Ojokoh and Asaolu, 2005; Utulu, 2004; Adenuga, 2004; Loughridge, 1996). Hence, the concept of information need embraces the materials required by people to ease, resolve, or otherwise address the situations arising in their lives (Shenton, 2007; Shenton and Dixon, 2004). Information needs research identifies two forms of information need: for everyday life information and for official information. Everyday life information is related to the social, political, economic, religious and cultural aspects of life that help people to live meaningfully. Official information is that which is required by people to perform their official roles as professionals, technicians, workers, students and researchers (Shenton and Dixon, 2004; Given, 2002; Sprink and Cole, 2001).

It follows that an assessment of the relevance and quality of university websites requires the identification of the information needs of website users. This is echoed by Petric (2006), who postulated that websites play important roles in providing the information people need to meet the goals they set in their everyday life. Kebede (2004) supported this with his position that the tasks people are involved in give rise to needs for content that may be retrieved from websites. Understanding and executing tasks require facts, figures and ideas that may be retrieved from websites.

The literature shows that management, academic and non-academic, students and researchers – internal stakeholders – are among the frequent users of university websites (Dutta, 2009; Petric, 2006; Kebede; 2004; Given, 2002). Other users may include external stakeholders like parents, prospective students, staff and employers, accreditation agencies, immigration and law enforcement agencies, donors and competitors. University stakeholders have information needs that revolve round their everyday life and their official needs. For example, Loughridge (1996) evaluated the administrative information needs of academic staff that perform administrative roles as heads of department, while Adekunmisi (2005) evaluated the research and teaching information needs of academic staff. These studies reveal that academics may perform dual roles and hence may have dual information needs. Similarly, Dumont and Frindte (2005: 74) commented that since psychologists are involved in both research and teaching the contents of their websites' homepages reflected "information about research and information about teaching."

Given (2002: 20) considered two categories of student: mature students and new students. He noted that "All students' information needs arise prior to setting foot on campus and reflects typical everyday concerns." Ojokoh and Asaolu (2005) established that the information most sought after by a group of Nigerian university students related to academic materials, entertainment and sports, information about other universities, and news. Guan, Nunez and Welsh (2002) presented the information needs of internal and external stakeholders in universities thus:

1. administrative policy makers and facilities:
   a. information to assist in resource management and strategic planning
   b. information to assist in recruitment and retention of students

2. external oversight agencies:
   a. information required to assess performance of the institution
   b. information to assess programs offered
3. students:
   a. lecture notes, tutorials and case study briefs
   b. examination time tables and results assessment.

Issues raised in the literature enumerated above can help us reach conclusions regarding the kind of web contents university websites in Nigeria would contain. This may include academic and non-academic web contents. There will also be everyday life content that may be useful to helping university websites users to address need arising from their everyday life needs

Methodology

Manual website examination and website architecture analysis based on the Watson Addy web architecture test site available at http://watson.addy.com/nph-watson5.cgi were adopted as methods of data collection. The Watson Addy has been used by AlHeyasat (2005) in a previous study. It was used in this particular study as a website architecture test tool to examine the following website architecture factors: HTML syntax, general word count, spell check, non-HTML words, download speed and search engine compatibility.

For the website content analysis, two broad categories of possible website content – official and everyday life – were identified. Each of these was divided into three subcategories: Finding (content that helps users find information); About (content that helps users know about activities and issues); and Services (content that provides insight into services available to users either within the universities or elsewhere.

Table 1: Classification of Website Contents

Classes of Official Contents			
S/N	**Finding**	**About**	**Services**
1	Portal	Colleges/Schools	Scholarships
2	Open Access Resources	Admissions	Library
3		Handbooks (staff & Students)	Course Registration
Classes of Everyday Life Contents			
1	Employment	Social Life	News
2	Important Dates	Clubs/Social Groups	Health Care
3	Sources of Funds	Host Community	Campus Guide

Sample and Sampling Method

The 103 universities in Nigeria listed in Nigeria's National Universities' Commission's (NUC) list of Nigerian universities available at www.nuc.edu.ng/pages/universities/asp comprised the study population. The Federal Government of Nigeria owns 27 of the 103 universities, 35 are owned by various State Governments, while 41 are in private ownership. Proportional sampling was used to determine the universities in each category whose websites were selected for study. The sample population was also stratified to include only universities that were established in or before 2005. This which meant that the websites that were studied had been in existence for at least five years, as shown in Table 2. It was assumed that a university's website would have reached maturity in terms of content and architecture if it has existed for at leas five years. This

eradicated the fear of some websites being new and with limited contents among those that were studied. The website analysis was done between December 2010 and January 2011.

Table 2: Distribution of Categories of Nigerian Universities

S/N	Categories of Universities	No. Established After 2005	Proportion Studied (Established before or by 2005
1.	Federal (27)	1 (3.7 %)	17 (62.0 %)
2.	State (35)	8 (22.9 %)	18 (59.2 %)
3.	Private (41)	18 (43.9 %)	15 (36.6 %)
4.	Total (103)	27 (26.2 %)	50 (48.5 %)

Based on the sampling method adopted, 48.5 % of Nigerian universities comprised the study.

Limitations

Descriptive data were used for this study. The data were extracted by examining the contents available in the university websites studied. The research did not consider the relevance or comprehensiveness of the contents but identified content categories to see if they were available or not. The Watson Addy web architecture analysis tool provides only machine generated data which meant that the accuracy of the results depended on the accuracy of the site to generate web architecture data. Since the researcher did not have a tool to evaluate the Watson Addy web architecture analysis tool, they relied on previous judgment of the site's ability to generate accurate website architecture data. The Nigeria universities studied and their URLs are listed in the appendix.

Findings

Although Chart 1 showed that more federal and private universities websites adopted the correct domain name, that is, the ***dot edu,*** it is worrisome to note that some of these universities adopted wrong domain names, such as dot com, dot net, and dot org. However, none of the universities was discovered to have any form of deficiency with their syntax, style and spelling accuracy.
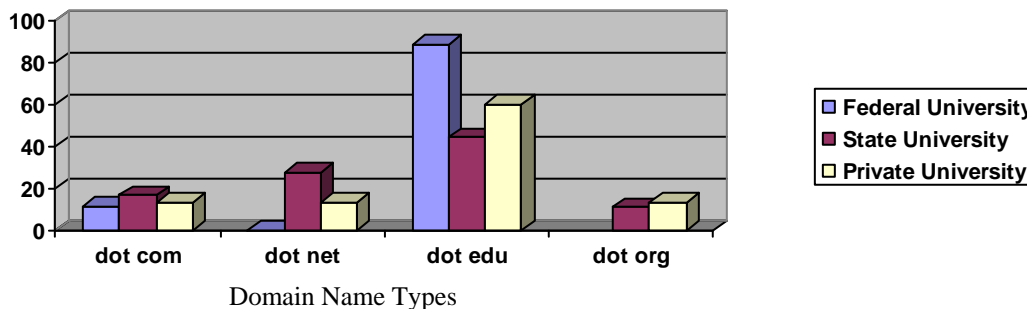

Chart 1: Domain Name Type, Syntax and Style Analysis

File Types and Download Speed

It was revealed that the websites of five (29.4 %) federal universities were made up of only HTML, while 12 (70.6 %) had both HTML files and Images. Of those that had image files, five

(29.4 %) had more than four images with one of them having as much as 18 images. It was also reported that two of the websites had 11 images each, while one had 13 images. It was also revealed that the average down load speed for federal university websites was 66.51 seconds.

Concerning state universities websites, it was revealed that five (27.8 %) of the 18 studied were made up of only HTML. Nine (50.0 %) of the remaining 13 state university websites that had both HTML and images had more than four images as follows: 46, 23, 17, 14, 12, eight, and six images with two having five images each. In addition, Nigerian state university websites average download speed was disclosed to be: 49.70 seconds. With regards to the private universities' websites, only nine (60.0 %) of the 15 private university websites that were studied had images and HTML files, while six (40.0 %) had only HTML files. Of these nine websites, three had as much as 22, 17 and nine images. Also, the average download speed for Nigerian private universities was calculated to be 48.27 seconds.

Table 3: Search Engine Compatibility

Federal University Websites				State University Websites				Private University Websites			
Meta Tag for Site Description		Meta Tag for Site Keyword		Meta Tag for Site Description		Meta Tag for Site Keyword		Meta Tag for Site Description		Meta Tag for Site Keyword	
No	%	No	%	No	%	No	%	No	%	No	%
3	17.7	4	23.5	4	22.2	4	22.2	6	40.0	3	20.0

Federal n= 17, State n= 18, Private n= 15.

Data elicited on availability of appropriate site description and keyword META Tags presented in the Table above showed that Nigerian university websites do not have required site description and keyword META Tags that will facilitate their listing by search engines and easy retrieval by web users as shown in the Table above. Only private universities recorded 40 % of universities websites with META tags for site description. It therefore, follows that Nigerian university website may not be visible on the Internet since meta tags are used as elements of HTML to provide site description that help categorize websites for easy retrieval on the web.

Websites Contents Analysis

Table 4: Available Official Information in Nigerian Universities' Websites

S/N	Official Information	Federal Universities		State Universities		Private Universities	
		No	%	No	%	No	%
1.	Colleges/Schools	16	94.1	16	88.9	15	100.0
2.	Admissions	16	94.1	14	77.8	11	73.3
3.	Course Registration	4	23.5	5	27.8	7	46.7
4	Scholarship	4	23.5	0	0.0	3	20.0
5.	Library	6	35.3	9	50.0	11	73.3
6.	Portal	5	29.4	7	38.9	10	66.7
7.	Open Access Resources	4	23.5	4	22.2	1	6.7
8.	Handbooks	0	0.0	0	0.0	4	26.7

Federal n= 17, State n= 18, Private n= 15.

Data on official information available in Nigerian universities' websites show that a significant percentage had information on the colleges and schools available in them. Other information

considered official such as course registration, scholarship, library, portal, open access resources and handbooks were not covered in most of the Nigerian university websites studied. Only half (50.0 %) of the state universities studied had information on libraries, while 73.3 % private universities listed information on libraries. The percentage of federal universities that had information on libraries in their websites was low considering that only 35.5 % of them had information on libraries irrespective of the importance of libraries to the lives of those expected to use university websites. Also, 66.7 % of the private universities had portal systems in their websites. Revelation in Table 4 showed that private universities in Nigeria performed better than federal and state universities with regards to the amount of official information contained in their websites.
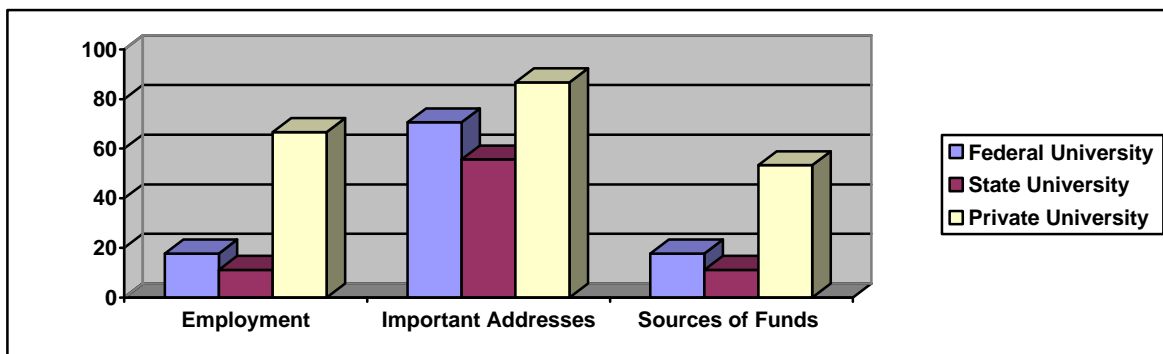
Federal n= 17, State n= 18, Private n= 15

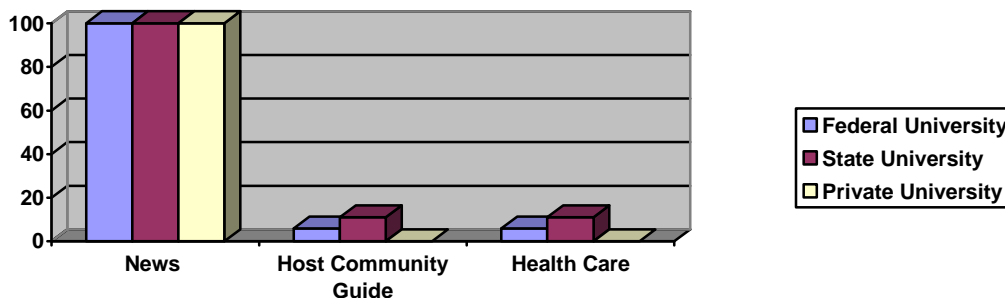**Chart 2: Everyday Life Information: Finding**

Of the three fundamental everyday life information that were categorized under finding, only information on important addresses were included by a majority of the three categories of Nigerian universities in their websites. For instance, 12 (70.6 %) Federal Universities, 10 (55.6 %) State Universities and 13 (86.7 %) private universities included important addresses in their websites. Other important information such as employment information was included by 3 (17.7 %) of Federal universities, 2 (11.1 %) of state universities and 10 (66.7 %) private universities. So also, only 8 (53.3 %) private universities included contents on sources of funds such as scholarships, bursary, etc. in their websites. Only 3 (17.7 %) federal universities had sources of funds information on their websites, while 2 (11.1 %) state universities had sources of fund information on their websites.
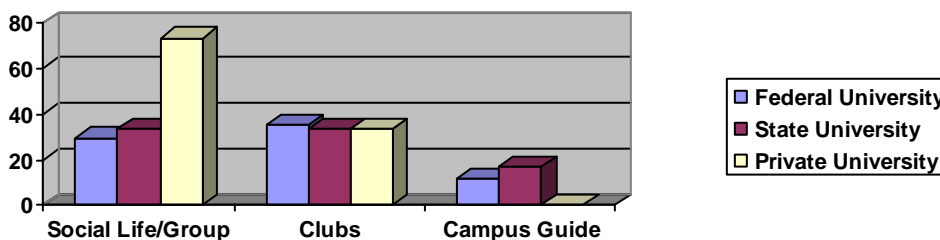
Federal n= 17, State n= 18, Private n= 15.

Chart 3: Everyday Life Information: About

Of the three types of everyday life information listed under about as shown above, only social life/group was included by 73.3 % of private universities. Other everyday information such as information on clubs and campus guide were not included by most Nigerian universities in their websites.

Federal n= 17, State n= 18, Private n= 15.

Chart 4: Everyday Life Information: Services

The revelation in Chart 4 showed that everyday life information on host community and health care were not included by a significant percentage of the universities websites studied. Only news was included by all the universities in their websites. Also, no private university gave information on their host communities and healthcare, while only 1 (5.9 %) of the federal universities and 2 (11.1 %) state universities included information on their host community in their websites.

Discussion

The first interesting thing about Nigerian universities as revealed in the study is their young age. Some of the Nigerian universities especially the private ones, were as young as five years. They may therefore, need to learn from older universities how to properly use their websites as means of creating access to relevant information stakeholders may require to carryout their official and everyday life functions. For example, the outcome of domain name evaluation carried out in the study indicated that Nigerian universities are still adopting wrong domain names such as dot com, dot org and dot net, instead of the appropriate domain name (dot edu) expected to be used by universities in Nigeria. this is despite the fact that domain names adopted by websites is the first level of their categorization as either academic websites, commercial websites or government websites meant to disseminate information on governance. The issue of misuse of domain name by Nigerian universities has appeared in the literature in the past (Agarin and Nwagwu, 2005 and Utulu, 2008) and seems not to have been corrected. The implication of this is that web crawlers used to extract, categorize and classify websites based o their domain names will classify Nigerian university websites with wrong domain names to domain areas which may not be appropriate to them. For instance, a Nigerian university website may be categorized as a website belonging to a commercial entity because its domain name is dot com.

Adopting appropriate domain name goes hand-in-hand with adding meta tags for site description and meta tags for site key word. The study revealed that a very significant number of the universities studied did not have meta tag for site description and meta tags for site key word, which further pointed to the fact that Nigerian university websites do not have architectural make ups that will support their listing by search engines. This will particularly make website users who use search engines to search for universities find it difficult to retrieve and access the information contained in Nigerian universities websites.

Another web architecture factor that raised suspicion as a result of the outcome of the study, is the number of images used in designing Nigerian universities websites. Images are very important in achieving aesthetics and supplementing text based information in websites. Although issues of images sizes were not included in the study, outcome related to the number of images used for

designing Nigerian universities websites showed that they may have used a number which we may consider a bit high. This is because the download speed experienced in the use of a website is a front end issue that relies on the download of website components which also include images. It therefore follows that the more a website is made up of images the more components it may need to down over time. The consequence of this reflected in the above 60 seconds average download down recorded in the study. Apart from the loss of aesthetics and beauty, introduction of noise, high download time may also put off web users, especially those who are from regions with limited bandwidth size and low speed.

The study outcome also indicated that Nigerian universities websites may not be able to meet their users' information needs due to the short fall in their contents. Major official and everyday life information contents were not available in majority of the websites. Crucial everyday life information contents on health care, social life/groups, campus guide, sources of fund and host community were not contained in majority of the websites. Having relevant and adequate information that meets web users information needs would have helped Nigerian universities get the attention of their stakeholder to news (which are mostly public relations based) disseminated through their websites. This would have made Nigerian universities able to serve the function of providing information to stakeholders and drawing their attention to news contained in the websites that are instrumental to strengthening the universities' public relations with their stakeholders.

Conclusion

There is no doubt that websites have become strong information and communication tool in modern times. It has helped universities reach unimaginable places and audiences. The growing interest in measuring the extent to which universities use their websites attests to the increasing importance universities now accord to their websites. It is quite unfortunate that efforts made by Nigerian universities to improve their academic standards, draw attention of the world to its activities and improve on their public image have not put into consideration the need to improve the ways they use their websites. Although observations showed that most Nigerian universities now do online registration of returning and new students using their websites, the outcome of this study has shown that they have not started taking seriously the importance of good architecture and relevant content as ways of achieving their website use goals and objectives. To be able to do these, Nigerian universities must first reconsider their domain names so as to adopt the correct one (dot edu) that will place their URL among academic institution on the web. They must also add site meta tag descriptions, site key words, and incorporate images in the right number. Although no standard number of images is recommended as the standard number of images to use for a website, it follows that most website designers observed that over use of images may distort both the communicability and architecture of a website. Frantic efforts must also be made to improve on web contents to cover both official information and everyday life information. Very crucial everyday life information such as information on healthcare, host community, social group, sources of funds, etc. should be added by Nigerian universities to their websites. The issue of including sources of funds, either through scholarship, bursaries, or work available to students through which they can raise funds cannot be over emphasized. The study therefore, concludes that Nigerian universities' management should make it a matter of urgency for their universities to improve their websites architecture and contents. This will make their websites become primary instruments for communicating with their stakeholders in the same way other universities around the world use their websites to communicate with their stakeholders. This will not only increase their websites usability and visibility, it will also increase the possibility of communicating and dealing with stakeholders that are miles separated from them.

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Appendix
List of Nigerian Universities that comprised the study

S/N	Federal Universities	Website URL	Year Founded
1	Abubakar Tafawa Balewa University, Bauchi State	http://www.atbu.edu.ng	1988
2	Ahmadu Bello University, Zaria, Kaduna State	http://www.abu.edu.ng	1962
3	Federal University of Technology, Ondo State	http://www.futa.edu.ng	1981
4	Federal University of Technology, Niger State	http://www.futminna.edu.ng	1982
5	University of Ibadan, Ibadan, Oyo State	http://www.ui.edu.ng	1948
6	University of Calabar, Cross River State	http://www.unica.edu.ng	1975
7	University of Ilorin, Kwara State	http://www.unilorin.edu.ng	1975
8	Michael Okpara University of Agric., Umudike	www.moua.edu.ng; www.moua.org	1992
9	Nnamdi Azikiwe University, Anambra State	http://www.unizik.edu.ng	1992
10	Obafemi Awolowo University, Osun State	http://www.oauife.edu.ng	1962

11	University of Abuja, Gwagwalada, Abuja	http://www.uniabuja.edu.ng	1988
12	University of Agriculture, Abeokuta, Ogun State	http://www.unaab.edu.ng	1988
13	University of Jos, Plateau State	http://www.unijos.edu.ng	1975
14	University of Lagos, Lagos State	http://www.unilag.edu.ng	1962
15	University of Maiduguri, Borno State	http://www.uam.mycportal.com	1988
16	Bayero University, Kano State	www.buk.edu.ng	1975
17	University of Nigeria, Nssuka, Enugu State	www.unn.edu.ng	1960
	State Universities	**Website URL**	**Year Founded**
1	Lagos State University Ojo, Lagos.	http://www.lasunigeria.org	1983
2	Adekunle Ajasin University, Akungba, Ondo Sate	http://www.ajasin.edu.ng	1999
3	Adamawa State University, Mubi, Adamawa State	http://www.adamawastateuni.com	2002
4	Nasarawa State University, Keffi, Nasarawa State	http://www.nsukonline.net	2002
5	Gombe State Univeristy, Gombe State	http://www.gomsu.org	2004
6	Niger Delta Unversity, Yenagoa, Bayelsa State	http://ndu.edu.ng.tripod.com	2000
7	Ibrahim Badamasi Babangida University, Lapai, Niger State	http://www.ibbuniversity.com	2005
8	Ladoke Akintola University of Technology, Ogbomoso, Oyo State	http://www.lautech.edu.ng	1990
9	Ambrose Alli University, Ekpoma, Edo State	http://www.aauekpoma.edu.ng	1980
10	Rivers State University of Science & Technology, Rivers State	http://www.ust.edu.ng	1979
11	Olabisi Onabanjo University Ago-Iwoye, Ogun State	http://www.oou-ng.com	1982
12	Anambra State University of Science & Technology, Uli, Anambra	http://www.ansu-edu.net	2000
13	Delta State University, Abraka, Delta State	http://www.delsung.net	1992
14	Imo State University, Imo State	http://imsu.edu.ng	1992
15	Niger Delta University, Bayelsa State	http://ndu.edu/ng.tripod.com	2000
16	Olabisi Onabanjo University, Ogun State	http://www.oou-ng.com	1982
17	Rivers State University of Science and Technology, Rivers State.	http://ust.edu.ng	1979
18	University of Ado-Ekiti, Ekiti State	http://www.unad.edu.ng	1988
	Private Universities	**Website UR**	**Year Founded**
1	Achievers University, Owo, Ondo State	http://www.achievers.edu.ng	2007
2	Ajayi Crowther University, Ibadan, Oyo State	http://www.acu.edu.ng	2005
3	American University of Nigeria, Yola, Adamawa	http://www.aun.edu.ng	2003

4	Babcock University, Ilishan-Remo, Ogun State	http://www.babcockuni.edu.ng	1999
5	Bells University of Technology, Otta,, Ogun State	http://www.bellsuniversity.org	2005
6	Bowen University, Iwo, Osun State	http://www.bowenuniversity-edu.org	2001
7	Caleb University, Lagos State	http://www.calebuniversity.edu.ng	2007
8	Caritas University, Enugu State	http://www.caritasu.edu.org	2005
9	Covenant University, Ota, Ogun State	http://www.convenantuniversity.edu.ng	2002
10	Crawford University Igbesa, Ogun State	http://www.crawforduniversity.edu.ng	2005
11	Igbinedion University Okada, Edo State	http://www.iuokada.edu.ng	1999
12	Lead City University, Ibadan, Oyo State	http://www.lcu.edu.ng	2005
13	Pan-African University, Lagos State	http://www.pau.edu.ng	2002
14	Redeemer's University, Mowe, Ogun State	http://www.run.edu.	2005
15	Renaissance University, Enugu State	http://www.renaissanceuniversity.com	2005

Biographies

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