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Usability and Accessibility Evaluation of Some Selected University Websites in Africa

By J. K. Alhassan and E. O. Okwum

Abstract

This study is on evaluation of usability and accessibility of some selected universities websites in Africa. University website pages frequently contain critical data about academic resources, campus events, and administrative policies. Most universities websites do not totally conform to the Web Content Accessibility Guidelines 2.0 (WCAG 2.0) standard, hence making the websites not easily accessible by users. Data for the evaluation were collected from the websites of the twelve different universities (three universities selected from a country in the four regions of Africa). Four tools were used for the analysis of the websites base on the categories, a tool picked from each category (Colour Contract Check, Web Accessibility Versatile Evaluator “Wave”. Taw and Achecker). Based on the results gotten from WAVE tool, Tunisia universities websites have the highest total errors of 152. The results gotten from TAW tool shows that South African universities websites have the highest problem with a total of 381. The Achecker result shows that Tunisia universities websites have more known problems with a total number of 356. The final result shows that University of Nigeria Nsukka has the best websites with least errors.

Keywords: Usability, Accessibility, Evaluation, University, Website, WCAG 2.0

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Introduction

Websites have turned out to be a standout amongst the most appropriate and secure methods for data communication. It uses covers all aspects of the human activities extending from business, education, entertainment and notice. The World Wide Web (www) is totally changing the conventional way that tie-up or organizations communicate with the general population. For affiliations, the web provides access to a substantial assemblage of people and enhances operational productivity. Websites are getting to be noticeably fundamental segments of an association's survival in the globalized competition

The site represents a tie-up, conveyance of title an association's way of life history, qualities, and vision. The Web site goes about as a conveying organization for administrations that encourage different undertaking a better half needs to perform. The web page likewise fills in as a stage through which an association can cooperate with its partner; the university web sites are no exemption. The university website provides international relations and security network, and a cost proficient and opportune technique to communicate with different cooperators, for example, students, faculty, administrative and visitors it is likewise a route for a university to shape its look-alike. University need to do all that they can to keep positive pictures with their different component part, and one approach to do this is to make use of the opportunities website presents.

The academic segment increasingly uses the Internet as a communication sensitive for internal and external purposes. Apart from the dissemination of general data, university websites may allow students and staff to apply on the web, response to students, register for e-learning sessions, acquire address notes, examine the library inventories, send and get content, check academic result, print study to mention few.

There is need to ensure that universities websites meet the required standard to make it easier for users to access the web. This study is on rating of usability and accessibility of some selected university websites in African. It is to find out if they conform to the Web Content Availability Guideline 2.0 standard, for easy usability and accessibility by users

Literature Review

There are a few sorts of website usability examinations that can be utilized depending on an appraisal reason, independent of what is to be developed which may incorporate an instructional creation or to assess a current foundation for appropriation, developing, or lengthiness (Nielsen, 2012). These include; (i) Explorative - Used ahead of agenda in product development to survey the sufficiency and simplicity of use of a preparatory outline or model, and in plus clients' mode of thinking and applied comprehension. (ii) Assessment: Used amidst product advancement or as a superior general usability test for design judgment; assesses invariable trials of the innovation to decide the fulfillment, adequacy, and general ease of use. (iii) Comparative degree: Compares at least two instructional innovative products or plans and recognizes the quality and defect of each. Web site are dominating television channel for disseminating information and gift administrations to the general population. Its value will be extraordinarily upgraded if the message is available as test conceivable assemblage of people, incorporating people with inabilities (Islam and Tsuji, 2011).

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Web Accessibility is to ensure that the site subject matter is accessible for all, incorporating masses with incapacities as well as the great unwashed with challenges, for example, the elderly and people with colour-visual deficiency, subjective and physical return, like, dyslexia, epilepsy, and so forth. An available site conveys messages more extensive over, as well as enhances the general usability for all clients. It likewise helps constructing a minding and comprehensive society. Kiyea and Aminat, (2014) completed a usability judgment investigation of some selected Nigerian universities site. A totality html records and html page turn of ten universities were randomly chosen for the assessment; mostly first and second-generation universities were considered. This was done by making utilization of automated tools, like website Page analyzer and HTML tool stash for information gathering.

The inner characteristic that were mulled over typified Aggregate number of hypertext markup language records; Amount html Page estimate; Aggregate size of image; Total number of effigy; Total number of outer papers; Total size of outside documents and in addition Load time. HTML check and repair; Web browser similarity; Pages with terrible connections individually and the different esteem were gathered and broke down and exhibited in the graphical SHAPE utilizing bar diagrams. From the outcome, it was found that a few colleges' sites clung to the set down edge estimations of these properties while some are still especially inadequate.

Oliha, (2014) conducted a probe on the network portal technology of Nigerian universities. This survey assesses ease of use or public toilet. A contextual analytic thinking of The University of Benin (UNIBEN) entanglement -based user port from the under study encompassing perspective through the four convenience builds (The interface and all data quality, model accessibility and general value and general fulfillment). The created online interface eases use achievement (WEBPUS) Model. It uncovered that the educational components and value of the web-based interface frame body of work has not empowered pupils' usability.

Adepoju and Shehu, (2014) led an investigation on "Usability of Academic Websites using Automated Tools". From their work, three Automated Tools were utilized to be specific Web Handiness Checker, HERA and WAVE. The automated cock assessed the similarity of the site with the WCAG criterion. Their event demonstrates that every one of the sites have various availability blunders, along these lines they are in absolute consistence with WCAG standard.

Asuquo, Adepoju, and Dele, (2009) stated that useableness judgment of intuitive framework has been a topical issue in human -Personal Computer (PC) collaboration. Individuals at various circumstance and spots have endeavoured to assess software, websites, and different tools to discover their floor of useableness. The quintessence is to show the stage to which such intuitive frameworks are anything but difficult to teach, simpleton to utilize, simple to recall and additionally to decide their sufficiency, productivity, mistake resistance, style and node fulfillment.

The assessment strategies connected so far have not yielded seek outcomes in the stop of view of clients. This work receives a client focused way to deal with ease of use assessment of two Nigerian universities website (www.unical.edu.ng and www.uniport.edu.ng) by applying a deliberate approach of including clients in performing set assignments (client examination) and utilizing the task consummation time as system of measurement. Information gathered from the appointment coating time were factually dissected for convenience criteria of learning ability, proficiency, and fulfillment. Inputs were acquired from node through five senses of poll on zones, where upgrades are wanted from the

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locales, and the plan assess overhaul cycle prescribed to the University website to revise ineffectively created port and substance. It is construed in the paper that www.unical.edu.ng got more inclination from the viewpoint of clients, because of its capacity to permit brisk, undertakings executing, quick downloads, viable path, mistake resistance, and negligible foundation shading.

Mentes and Aykut, (2012) stated that, websites are rising as a key segment of an association's natural selection in the constantly globalizing focused human race. Usability of a site has accepted a lot of significance as far as fulfilling site clients' needs and desire. The point of the interrogation is to assess and to investigate the ease of use level of Namik Kemal University (NKU) website and give direction to grow better and more usable internet site. The scrutiny speculations have postured six diverse hypothetical parts to be emphatically connected with site ease of use. The issues have uncovered that. Five of the six variables can emphatically and fundamentally influence the site convenience view of NKU portal. Results likewise uncovered that, a serving of the statistic factors tried, for example, gender preference and web involvement, impact affect ease of use impression of individual clients. Moreover, the interrogation likewise public lecture about the potential reward of enhanced site, ease of use on administration and proposes approaches to improve the usability of internet sites.

Utulu, (2012) study, received data needs investigation hypothesis to complete investigation of the meaning of sites of 50 Nigerian colleges. Two general classifications of conceivable website substance functionary and regular twenty-four hours today existence data substance were distinguished and examined. It additionally embraced the James Watson Addy Web Architecture test, to do engineering interrogatory of the sites in the accompanying ranges: dialect sentence structure, style, spelling exactness, down swiftness, record sorts and web crawler similarity utilizing Meta label accessibility. The examination was inspired by the development ebullience of specialists in the part site substance and invention play in accomplishing senior high web ease of use. The breakthrough uncovered notable shortcomings like, wrong space name appropriation, blunders in sentence structure, poor style, spelling misunderstanding and non-accessibility of Meta label in the site. Moreover, the website did not contain the greater part of the official and regular information anticipated that would be in a college site. In view of the consequence of the investigation Nigerian college ' website can be by and large classified as having pitiful substance and imperfect engineering. The theme presents proposal of joining the improvement of substance and design of the sites.

Junaini, (2002) stated that, great extents of node to university internet site are candidate for accession or are prospective candidates. This intended interest group clump for the most part has arrangement of objective in finding the data required from the site. Their involvement in utilizing the university site, will confirm whether they are impressed by the information from the site or not and this without a doubt will give gist on the universities ratification. To follow their prerequisites, the college site must meet certain simplicity of use measures. The tip of this investigation is to assess whether the college websites are satisfying the simplicity of use rule given by Web pages Content Availability Guide (WCAG) or not. This interrogation solvent the inquiry whether the sites are in line in their simplicity of use and receptivity. The ease of use and openness of the eleven Malaysian state funded college are thought about by utilizing two programmed assessment instrument that is Bobby and LIFT. This chapter likewise looked at the eleven Malaysian state funded colleges' site in terms of route plan. A few techniques in finding the group of lookers-on arranged necessity for the site are proposed.

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Petrie and Bevan, (2009) presents a scope of assessment techniques that help engineer in the formation of intuitive electronic items, administrations and situations (E-Systems) that is both simple and wonderful to use for the intended pastime group. The intended interest group may be the broadest scope of mortal, incorporating individuals with impediment and more established individuals or it may be a highly particular gather of citizenry, for example, universities standby examining science. A scope of techniques for assessing receptiveness, serviceableness and client experience is laid out, with data about tantrum use and strengths and shortcomings.

Kane, Shulman, William Shockley, and Ladner, (2007) on University entanglement web site page assume a focal character in the utilization of nowadays and imminent postsecondary understudies. College destination that is not open may reject individuals with incapacities from cooperation in instructive, social and expert exercises. With a specific end finish to evaluate the present condition of college site receptivity, played out a multi-technique interrogation of the manage page of 100 best global colleges. Each webpage was dissected for consistence with availability model, moving-picture show openness, substitute dialect and content just substance, and nature of web openness explanation. Results demonstrated that many best colleges keep on having availability issues. Universities site openness likewise changes significantly crosswise over various nations and geographic sphere.

Methodology

Data Collection

Data for the evaluation were collected from the websites of the twelve different universities (three universities selected from a country in the four regions of Africa) under study. The countries and universities' websites that were evaluated are;

Tunisia: Manouba University, Manouba – Website Address (<http://www.uma.rnu.tn>), Carthage University – Website Address (<http://www.uss.rnu.tn>) and University of Sousse, Sousse – Website Address (<http://www.uc.rnu.tn>)

South Africa: University of Cape Town – Website Address (<http://www.uct.ac.za>), University of Limpopo - Website Address (<https://www.ul.ac.za>), and University of Pretoria - Website Address (<http://www.up.ac.za>)

Kenya: University of Nairobi – Website Address (<http://www.uonbi.ac.ke>), Maseno University – Website Address (<http://www.ku.ac.ke>) and Laikipia University – Website Address (<https://www.mu.ac.ke>)

Nigeria: Federal University of Technology Minna – Website Address (<https://www.futminna.edu.ng>), University of Nigeria, Nsukka – Website Address (<http://www.unn.edu.ng>) and University of Benin – Website Address (<https://www.uniben.edu>)

Tools Used for the Analysis

Four tools were used for the analysis of the websites base on the categories, a tool picked from each category (Colour Contract Check, Web Accessibility Versatile Evaluator “Wave”. Taw and Achecker).

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Colour Contrast Check: The Colour Contrast Check Tool permits to stipulate a fore ground and a background colour and to regulate if they offer enough of a contrast "when watched by somebody having colour shortfalls or when watched on a black and white monitor". This tool is for gagging colours. It tests if both colour alteration and the brightness difference surpass their verge. It designates a pass if only one of the two values surpass their threshold. And fail to pass if neither value surpasses its threshold. The tool also indicates if the colours pass the newer WCAG 2.0 contrast ratio formula. The WCAG 2.0 formula differentiates between texts smaller than 18pt text larger than 18pt (or text that is bold and larger than 14pt). For AA compliance, text should have a ratio of at least 4.5:1 (larger text, at least 3:1). For AAA compliance, text should have a ratio of at least 7:1 (larger text, at least 4.5:1). A three-character value can be entered (for example; 036) and it will automatically convert it to its' six-character version.

Web Accessibility and Versatile Evaluator (WAVE), is an instrument created by Web that is accessible both on the web and as a Firefox add-on. It reports availability infringement by commenting on a duplicate of the page that was assessed and, in the meantime, giving suggestions on the most proficient method to repair the website page. Instead of giving an unpredictable specialized report, WAVE demonstrates the first Web page with inserted symbols and pointers that uncover the availability data within the page. WAVE carried out evaluation based on WAIG

TAW: References WCAG 1.0, 2.0 has a set of heuristics for mobile availability. Developed by the CTIC Centro Tecnológico, TAW evidently marks the availability damages that it realizes by providing a marked version of the web site as well as recommendations on how to correct such violations. TAW classify the result of valuation into perceivable, operable, understandable and robust, other attributes comprises warning, difficulties and not reviewed. It is obtainable online and as a desktop application as well as a Firefox add-on.

Achecker: Accessibility checker is an open source accessibility evaluation tool that was developed in 2009 by the Inclusive Design Research Centre (formerly known as the Adaptive Technology Resource Centre) of the University of Toronto Canada. Using this tool, the user can submit a web page via its URL or by uploading its HTML file and can subsequently select which guidelines to evaluate it against, namely the HTML Validator, BITV, Section 508, Stanca Act, WCAG 1.0 and WCAG 2.0.

Results and Discussion

Web Accessibility Versatile Evaluator (W.A.V.E)

This evaluation online automated tool detected the Errors, Alerts and Features using <http://wave.webaim.org>. As shown in table 4.1, others are structural elements, HTML5 and ARIA, contrast errors and outline.

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Table 4.1: Results of WAVE of African universities websites

Country	Universities	Website Address	Errors	Alerts	Features
Tunisia	Manouba University	http://www.uma.rnu.tn	54	35	37
	Carthage University	http://www.ucar.rnu.tn	33	166	33
	University of Sousse	http://www.uc.rnu.tn	65	46	8
South Africa	University of Cape Town	http://www.uct.ac.za	36	61	10
	University of Limpopo	https://www.ul.ac.za	33	49	21
	University of Pretoria	http://www.up.ac.za	10	20	42
Kenya	University of Nairobi	http://www.uonbi.ac.ke	9	50	11
	Maseno University	http://www.maseno.ac.ke	28	105	15
	Laikipia University	http://www.laikipia.ac.ke	16	27	31
Nigeria	FUTMinna	https://www.futminna.edu.ng	31	48	21
	UNN	http://www.unn.edu.ng	2	1	0
	University of Benin	https://www.uniben.edu	21	17	29

Based on the results gotten from WAVE tool, Tunisia universities have the highest total errors of 152, followed by South Africa with 79 total errors, then Nigeria with 54 total errors and lastly Kenya with 53.

Errors were categorized into the following: Empty link (contain no text); Empty button (button is empty/ has no value text); Missing form label (a form control does not correspond label); Linked image missing alternative text (an image without alternative text results in an empty link). Signals are characterized into the following: Skipped heading level (a title level is hopped); Non-script element, (a <nonscript> element is existing); Missing first level heading, (a page does not have a initial level title); Redundant link. (adjacent links go to the similar URL), Redundant title text, (title attribute text is the similar as text or substitute text); and Doubtful link text, (link text covers inessential text or may not make sense out of context). Features were characterized into the following: Linked images with alternative text, (alternative text is current for an image that is within a link) and Alternative text, (image alternative text is present).

T. A. W

This tool was used to check the difficulties, notices, and not reviewed found on the African universities websites. The results gotten are shown in table 4. 2.

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Table 4.2: African universities websites

Country	Universities	Website Address	Problems	Warnings	Not Reviewed
Tunisia	Manouba University	http://www.uma.rnu.tn	84	169	15
	Carthage University	http://www.ucar.rnu.tn	158	173	14
	University of Sousse	http://www.uc.rnu.tn	134	1608	16
South Africa	University of Cape Town	http://www.uct.ac.za	60	498	17
	University of Limpopo	https://www.ul.ac.za	87	254	16
	University of Pretoria	http://www.up.ac.za	234	186	15
Kenya	University of Nairobi	http://www.uonbi.ac.ke	14	370	14
	Maseno University	http://www.maseno.ac.ke	39	202	15
	Laikipia University	http://www.laikipia.ac.ke	74	3404	17
Nigeria	FUTMinna	https://www.futminna.edu.ng	-	-	-
	UNN	http://www.unn.edu.ng	5	1	17
	University of Benin	https://www.uniben.edu	170	334	17

The results gotten from TAW tool shows that South African universities websites have the highest problem with a total of 381 problems, followed by Tunisia with a total of 376 problems. Nigeria have a total of 175 problems from UNN and UNIBEN, FUTMinna returned a server error report and so the T.A.W could not identify the problems. Kenya have the least problems with a total number of 127 problems.

A Checker

The evaluation tool classifies the problems into known problems, likely problems and potential problems. The results obtained from <https://achecker.ca> is shown in table 4.3.

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Table 4.3: Results of Achecker for universities websites in Africa

Country	Universities	Website Address	Known problems	Likely problems	Potential problems
Tunisia	Manouba University	http://www.uma.rnu.tn	149	1	449
	Carthage University	http://www.ucar.rnu.tn	41	0	753
	University of Sousse	http://www.uc.rnu.tn	166	0	586
South Africa	University of Cape Town	http://www.uct.ac.za	85	1	667
	University of Limpopo	https://www.ul.ac.za	38	0	121
	University of Pretoria	http://www.up.ac.za	12	0	1043
Kenya	University of Nairobi	http://www.uonbi.ac.ke	5	2	483
	Maseno University	http://www.maseno.ac.ke	52	5	582
	Laikipia University	http://www.laikipia.ac.ke	127	1	762
Nigeria	FUTMinna	https://www.futminna.edu.ng	83	4	608
	UNN	http://www.unn.edu.ng	3	0	12
	University of Benin	https://www.uniben.edu	124	7	463

The Achecker report showed that Tunisia universities websites have more known problems with a total number of 356 known problems, followed by Nigeria with a total of 210 known problems, Kenya with a total of 182 known problems and lastly South African universities with a total of 135 known problems. Most of the problems had img element missing alt attribute.

Contrast Colour Checker

This is a tool for inspection of foreground and background colour mixtures of all DOM elements, and decisive if they provide adequate contrast when watched by someone having colour shortfalls. The Contrast Ratio, Brightness Difference and Colour Difference are checked on the body of the carefully chosen African universities website as shown in table 4.4.

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Table 4.4: Result of Contrast Colour Checker

Country	Universities	Website Address	Contrast Ratio	Brightness Diff.	Colour Diff.
Tunisia	Manouba University	http://www.uma.rnu.tn	18.82:1	241	728
	Carthage University	http://www.ucar.rnu.tn	21:1	255	765
	University of Sousse	http://www.uc.rnu.tn	3.84:1	90	8
South Africa	University of Cape Town	http://www.uct.ac.za	12.63:1	204	612
	University of Limpopo	https://www.ul.ac.za			
	University of Pretoria	http://www.up.ac.za	21:1	255	765
Kenya	University of Nairobi	http://www.uonbi.ac.ke	1.47	34	95
	Maseno University	http://www.maseno.ac.ke	15.31:1	219	651
	Laikipia University	http://www.laikipia.ac.ke	21:1	255	765
Nigeria	FUTMinna	https://www.futminna.edu.ng			
	UNN	http://www.unn.edu.ng	21:1	255	765
	University of Benin	https://www.uniben.edu	12.63:1	204	612

From table 4.4, in Tunisia, Carthage University has the highest brightness with 255. In South Africa, University of Pretoria has the highest brightness with 255. In Kenya, Laikipia University has the highest brightness with 255, while in Nigeria, University of Nigeria, Nsukka, has the second highest brightness with 255.

Findings

Based on the automated tools used which includes Achecker, WAVE, TAW and color contrast tool the best university websites are selected from each continent to be compared so as to generate the best result.

NIGERIA - From the results of all the automated tools, it is deduced that from West Africa. The University of Nigeria, Nsukka has the best website and conforms to the WCGA 2.0

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TUNISIA - Based on the analysis carried out from the automated tools it is concluded that Cartage University is the best from North Africa.

KENYA - Representing the East Africa base on the automated tools used, the result deduced shows that the Nairobi University has the best website from the randomly selected Universities.

SOUTH AFRICA – Representing South Africa based on the result generate, it is deduced that all the Universities have similar value and the best could not be ascertained because it does not totally conform to the WCGA guidelines. For the color contrast analyzer all the websites do not totally conform to the WCGA 2.0 guidelines.

The result generated from the four tools used to analyze the four best website shows that www.unn.edu.ng University of Nigeria Nsukka (UNN) has the best website though it does not totally conform to the WCAG 2.0 standard but has the least of error compared to all the randomly selected websites.

Conclusion

This study evaluated the usability and accessibility of some selected university in Africa. The website of three universities each were evaluated for usability and accessibility, the three universities were selected from four countries each in the four regions of Africa; North, South, East and West. The countries include, Tunisia from Northern Africa, South Africa from Southern Africa, and Republic of Kenya from Eastern Africa and Nigeria from West Africa. The result analyzed shows that University of Nigeria Nsukka has the best websites with least errors.

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