Web-Based Applications for Instructional Delivery in Tertiary Institutions in Rivers State: Extent of Usage and Implication for Development Strategy

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Abstract
The study was carried out to determine the extent of usage of web-based applications (WBA) in instructional delivery in tertiary institutions and implication for development strategy. Two research questions guided the study and two null hypotheses were tested at 0.05 level of significance. A descriptive survey research design was used for the study. The research population was made up of 140 lecturers comprising 70 male and 70 female lecturers selected from seven tertiary institutions in Rivers State through the purposively sampling technique. Ten items structured questionnaire titled “Web-based application for instructional delivery Questionnaire (WBAIDQ) was used for the survey. The instrument was validated by three experts in Measurement and Evaluation. The Pearson product Moment Reliability Co-efficient was used to obtain a correlation value of 0.87. Data were analyzed using mean and standard deviation while t-test analysis was used to test the null hypotheses at 0.05 level of significance. Findings arising from the study revealed that male and female lecturers in tertiary institutions in Rivers State usage of restricted access WBAs such as e-mail, Facebook, WhatsApp, Google group and Nairaland group for instructional delivery was low and the usage of non-restricted access WBAs such as e-portal, RSSFEED, Wiki, You Tube, Blog for instructional delivery was low. It was concluded that the usage of Web-based applications in instructional delivery by lecturers in tertiary institutions in Rivers state was low. It was recommended among others that government and management of tertiary institutions in Rivers state should encourage lecturers to make high use of WBAs in instructional delivery to support the conventional classroom/laboratory scenarios for effective and quality manpower development required for national development.

Keywords: Web-Based application, ICT, Instruction, Education.

Introduction
Access to Information and Communication Technology (ICT) by teachers and students in teaching and learning process has been limited in African countries; resulting to a major barrier in building the manpower needs required to develop the African society (Anyaogu, 2012). ICT compliance in tertiary institutions in African countries is expected to advance when web based applications are fully integrated in instructional delivery as obtainable in the
developed countries of the world (Yen-Ting, 2013). This would also open up other numerous possibilities for the advancement of teaching and learning process and by extension, further development in Africa (Andrea, 2015). One of the major areas of ICT use in education is in the implementation of web-based application in instructional delivery as this is expected to enhance quality teaching and learning process.

Web-based application (WBA) also known as “web apps” represents applications that can be accessed by users through an Interface over a network such as Internet or Intranet (Coleman, 2017). Web-based application also may be client-based, where a small part of the program is downloaded to a user’s desktop but processing is done over the internet on an external server. Web-based applications often run inside a web browser. Web-based applications are not intended to be a unique educational method but rather to complement the methods of instructional delivery such as classroom/lecture hall scenarios (Onwumere, 2012). WBA helps instructional delivery in any educational process due to its dynamic, interactive and engaging content. It provides real opportunities for individualization of instruction enrich and deepen computer skills acquisition, motivation and engages learners in systematic process (Ajuzie and Ukegbu, 2015). Web-Based instructions when successfully implemented in instructional delivery in schools of higher learning in Rivers State is expected to open more opportunities for ICT integration in education and research partnership. According to Coleman (2017), WBA are deployed with some level of access granted to the intending users. The researchers have identified some WBA applied in teaching and learning process based on the level of access granted to users. Facebook, e-mail, WhatsApp, Google group and Nairaland group are identified as restricted access web-based application. Users of restricted access WBA are expected to be members of the group for which the content of the web-based application is prepared. Restricted access WBA is expected to be accessed by password, unique numbers or names peculiar to members or predefined users for the purpose of security of content. Non-restricted access WBA is available to users with access to internet or intranet. RSSFEED, e-portal, Wiki, YouTube, Blog are identified as non-restricted access WBA for the purpose of the study. The level of Instructional delivery through the WBA produces knowledge in content and ICT skills (Onwumere, 2012).

Instructional delivery in classroom/laboratory scenarios in tertiary institutions in developed nations has been improved through innovations in ICT (Andrea, 2015). Globalization has great influence on higher education and now stands as a standard for comparative ranking for tertiary institutions (Onwuagboke & Singh, 2016). The global method of instructional delivery, character and composition of learners and the learners’ outcome are changing to match the present method of problem solving (Effiong & Odey, 2014). Instruction delivery in large class size in tertiary institutions in Nigeria can no longer achieve effective manpower development without full integration of WBAs in teaching and learning process (Egbomo et al, 2012). Quality and quantity of teaching could be achieved when WBAs are integrated in instructional delivery. Policies are being made by management of many tertiary institutions in Nigeria to integrate ICT in teaching and learning process (Onwuagboke & Singh, 2016). However, it is worrisome that expected level of implementation and usage of WBAs by male and female lecturers in tertiary institutions in Nigeria is still unclear. According to onwuagboke & Singh (2016), the attitude of the academic staff (Male and Female) who do not feel favorably disposed towards ICT may likely affect utilization of ICT in teaching. Among other challenges, Male and Female lecturers with varying attitude towards ICT determine the level of its integration in instructional delivery.
The Statement of Problem
Tertiary institutions in Nigeria have not fully integrated ICT tools in instructional delivery to complement classroom/laboratory scenarios and instructions are not effectively delivered to the learners (Egbomo J.E. et al, 2012). Large class size in tertiary institutions in Nigeria could not provide for effective lecturer-student interactions and lectures-students interaction periods are limited. Tertiary institutions in Nigeria should not be left out in globalization of education through ICT. Therefore, the researchers deemed it fit to examine the extent of usage of web-based applications among male and female lecturers in tertiary institutions in Rivers state, Nigeria and the implication for development strategy.

The Purpose of The Study
The main purpose of this study is to determine the extent of usage of Web-Based applications among male and female lecturers in tertiary institutions in Rivers state and the implication for development strategy. Specifically, the study sought to determine:

1. The extent of male and female lecturers’ usage of restricted access Web-Based applications in instructional delivery in tertiary institutions in Rivers state.
2. The extent of male and female lecturers’ usage of non-restricted access Web-Based applications in instructional delivery in tertiary institutions in Rivers state.

Research Questions
The following two research questions guided the study:

1. To what extent do Male and Female lecturers use restricted access Web-based Applications in instructional delivery in tertiary institutions in Rivers state?
2. To what extent do Male and Female lecturers use non-restricted access web-based Application in instructional delivery in tertiary institutions in Rivers state?

Hypotheses
The null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the respondents’ means ratings of both male and female lecturers on the usage of restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state.
2. There is no significant difference in the respondents’ mean ratings of male and female lecturers on the usage of non-restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state.

Literature Review/Theoretical Frame Work
Every good Software design is expected to support certain characteristics some of which are reliability, maintainability, scalability, dependability and malleability. A software process provides the framework from which a comprehensive plan for software development can be established. A small number of framework activities are applicable to all software projects, regardless of their size or complexity. A number of different tasks; milestones, work products and quality assurance points enable the framework activities to be adapted to the characteristics/features expected of the software. The activities that bring about the development of web-based application are collectively referred to as web engineering process (Hong-Mei, 2012).
Features of Web-Based Application to be Considered During Design
i. Web based applications are network intensive by its nature. The applications reside on a new network and serve the needs of diverse clients. The network can be internet, intranet or the extranet.
ii. Content driven: Web applications use hypertext media to carry out its function which is to present text, audio/video, graphic content to the end users.
iii. Continuous evolution: Unlike non web based software which has to follow planned chronologically based releases called versions, web application does not have such liberty as its content is dynamic and changes constantly.
iv. Immediacy: Developer use methods of designs, analysis and implementation, that have been adapted in delivering web-based applications resulting from the usual short period of project.
v. Security: it could be impossible to limit the end users of web-based applications, however, strong security measures must be implemented throughout the structure that support the web application due to the insecure nature of the internet.
vi. Aesthetics: capturing of users interests make aesthetics extremely important in web-based applications.

Web Engineering Process Model

Fig 1: Web Engineering Process Model

Source: Hong-Mei (2012).

Developing an effective web-based application for instructional delivery in tertiary institutions in Rivers requires organized process. Organized processes are important in standardization, maintainability, efficiency, scalability, and dependability of web based applications. One of the organized processes that could enhance the required efficiency is the
web engineering process model (fig.1). The model consists of spiral and parallel processes where each process is both iterative and incremental as it usually produces a deliverable. Each cycle is a complete iteration producing a milestone for the software process. So many people are involved in web content design such as artists, musician, sound engineers, architects, navigation and interface designers. The process model outlines the following processes (Hong-mei, 2016):

**Formulation**
Formulations define the goals of any web-based application project and the expected users’ profile. It also identifies the scope of the development efforts and the critical success factors for the development. In development of Web-based applications, the main motivation for the project, the need users the web application must be determined.

**Planning**
Planning as a process in the web engineering process model is essential in identifying the possible risks that can be faced during web engineering, scheduling time duration to execute the project and cost estimation. Some of the risks may include insecurity of content, untimely delivery of the project, wrong estimation and loss of web engineering team member.

**Analysis**
A proper Analysis is an important aspect of web engineering. Every design of web-based application requires four stages of analysis which include content analysis, interaction analysis, functional analysis and configuration analysis. The analysis involves elaboration of the scope which includes identification of targeted users, review of overall goals and competing web applications and the specification of services the web application will provide. The configuration analysis of the system will be such that the system can be accessed by multiple users at a time. This informs the use of server for the collection of information into the database. This same reason informed the choice for making the system web-based, which implies that it will run on the internet.

**Web Engineering Team**
The web engineering team must consist of a broad array of specialists, including:

i. Content developers and providers comprises of art work designers, text writers, graphic designers and media experts.

ii. Web publisher: This group comprises of technical and non-technical personalities whose duties includes the organization of the contents that have been developed by the content developers for inclusion into the web application.

iii. Web engineers determine the requirements, draw up specification, scope, analysis and also determine the architecture, interfaces navigation, implementation and testing of the web application. They are expected to have good understanding of component technology, web programing languages, databases, network security and even multimedia concept.

iv. Support specialist ensures web application supports such as removal of errors, corrections, adaptation of the site and removal of content.

iv. Web masters decide and implement policies, enforce access rights, measure web traffic and supervise security.
Methodology

Descriptive survey design was adopted for the study. The researchers considered this design appropriate for this study since it intended to collect data from lecturers in tertiary institutions in Rivers state. The sample study consisted of 140 lectures randomly selected from 7 tertiary institutions in Rivers state (70 Male and 70 Female). Instrument for data collection was a structured questionnaire titled “Web-based Application for Instructional Delivery Questionnaire (WBAIDQ)” The questionnaire was structured on a three-point rating scale response categories as “High extent”, “Moderate extent”, “Low extent. The instrument was validated by three experts, two from school of education and one from department of computer science education both at federal college of education (technical) Omoku. The re-test method was used to establish the reliability of the instrument, and the Pearson product moment correlation coefficient was used to test the reliability of the instrument which yielded a co-efficient of 0.87 which indicated that the instrument was reliable for the study. Administration of the instrument was carried out personally by the researchers with aid of two research assistants. All copies of questionnaire distributed were retrieved and was used for the analysis. Data collected regarding research questions were analyzed using descriptive statistics (mean and standard deviation) while t-test was used to analyze the hypotheses. In order to determine extent of usage of web-based application by lecturers in tertiary institutions in Rivers State, edition rule based mean rating of 2.0 was used. Therefore, items with mean rating of 1.5 – 2.0 were regarded as high extent, items with mean rating of 1.0 – 1.49 were regarded as moderate extent and items below 1.0 were regarded as low extent. In testing hypothesis, a null hypothesis was accepted where the calculated t-value is less than critical value of t. it means that there is no significant difference and the hypothesis will not be rejected. Conversely, where the calculated t-value is equal to or greater than the critical t-value, it means there is significant difference and the hypothesis will be rejected.

Results

Research Question 1

To what extent do male and female lecturers use restricted access web-based applications in instructional delivery in tertiary institutions in Rivers State?

Table 1: mean responses of male and female lecturers on the extent of usage of restricted access web-based application for instructional delivery.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Restricted web-based application</th>
<th>Mean (female)</th>
<th>Mean (male)</th>
<th>Remark (female)</th>
<th>Remark (male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>e-mail</td>
<td>0.74</td>
<td>0.89</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>2</td>
<td>Facebook</td>
<td>0.44</td>
<td>0.64</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>3</td>
<td>WhatsApp</td>
<td>0.89</td>
<td>0.99</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>4</td>
<td>Google group</td>
<td>0.54</td>
<td>0.64</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>5</td>
<td>Nairaland group</td>
<td>0.54</td>
<td>0.55</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td>Mean of means</td>
<td>0.63</td>
<td>0.74</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>
The result of the study in table one shows that all the items had their means below 1.0. Therefore, all the male and female lecturers used for the study, have made low use of restricted web-based application in delivering instructions in tertiary institutions in Rivers State. The mean of means revealed that male and female lecturers in tertiary institutions in Rivers state make low use of restricted web-based applications for instructional delivery with a mean scores of 0.63 and 0.74 respectively.

**Research Question 2:**
To what extent do male and female lecturers use non restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state?

**Table 2: mean responses of male and female lecturers on the extent usage of non-restricted access web-based application for instructional delivery.**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Non-Restricted web-based application</th>
<th>Mean (male)</th>
<th>Mean (female)</th>
<th>Remark (female)</th>
<th>Remark (male)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>e-portal</td>
<td>0.99</td>
<td>0.99</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>2</td>
<td>RSSFEED</td>
<td>0.75</td>
<td>0.79</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>3</td>
<td>Wiki</td>
<td>0.31</td>
<td>0.53</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>4</td>
<td>YouTube</td>
<td>0.28</td>
<td>0.34</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td>5</td>
<td>Blog</td>
<td>0.51</td>
<td>0.60</td>
<td>low</td>
<td>low</td>
</tr>
<tr>
<td></td>
<td>Mean of means</td>
<td>0.57</td>
<td>0.65</td>
<td>low</td>
<td>low</td>
</tr>
</tbody>
</table>

The result of the study in table two shows that all the items had their means below 1.0. Therefore, all the male and female lecturers used for the study, have made low use of non-restricted web-based application in delivering instructions in tertiary institutions in Rivers State. The mean of means revealed that male and female lecturers in tertiary institutions in Rivers state make low use of restricted web-based applications for instructional delivery with a mean scores of 0.57 and 0.65 respectively.

**Testing the Hypotheses**

**Null Hypotheses one**
There is no significant difference in the respondents’ means ratings of both male and female lecturers on the usage of restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender.
Table 3: Means, Standard Deviations and t-test for male and female lecturers’ usage of restricted access web-based applications in instructional delivery in tertiary institutions in Rivers state on the basis of gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t-test</th>
<th>t-crit</th>
<th>α</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
<td>0.74</td>
<td>.98</td>
<td>138</td>
<td>0.13</td>
<td>1.96</td>
<td>0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>70</td>
<td>0.72</td>
<td>.97</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data in Table 3 shows that the t-test calculated of 0.13 is less than the t-critical value of 1.96 at 138 degree of freedom at 0.05 level of significance. Since the calculated value is less than the t-critical value, the null hypothesis is accepted. This implies, therefore, that there is no significant difference in the mean responses of male and female lecturers on the usage of restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender. The null hypothesis was therefore accepted while alternate hypothesis was not retained.

Null Hypotheses Two
There is no significant difference in the respondents’ mean ratings of male and female lecturers on the usage of non-restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender.

Table 4: Means, Standard Deviations and t-test for male and female lecturers’ usage of non-restricted access web-based applications in instructional delivery in tertiary institutions in Rivers state on the basis of gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>df</th>
<th>t-test</th>
<th>t-crit</th>
<th>α</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70</td>
<td>0.65</td>
<td>.84</td>
<td>138</td>
<td>0.21</td>
<td>1.96</td>
<td>0.05</td>
<td>NS</td>
</tr>
<tr>
<td>Female</td>
<td>70</td>
<td>0.62</td>
<td>.79</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data in Table 4 shows that the t-test calculated of 0.21 is less than the t-critical value of 1.96 at 138 degree of freedom at 0.05 level of significance. Since the calculated value is less than the t-critical value, the null hypothesis is accepted. This implies, therefore, that there is no significant difference in the mean responses of male and female lecturers on the usage of non-restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender. The null hypothesis was therefore accepted while alternate hypothesis was not retained.

Key Findings
The research work provides the following Key findings:
- Male and Female Lecturers in tertiary institutions in Rivers state made low use of restricted access web-based applications such e-mail, Facebook, WhatsApp, Google group and Nairaland group.
• There is no significant difference in the mean responses of male and female lecturers on the usage of restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender.

• Male and Female lecturers in tertiary institutions in Rivers state made low use of non-restricted web-based applications such as e-portal, RSSFEED, Wiki, YouTube and Blog.

• There is no significant difference in the mean responses of male and female lecturers on the usage of non-restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender.

Discussion of Findings
The result of the analysis in table one shows that male and female Lecturers in tertiary institutions in Rivers state made low use of restricted web-based applications such e-mail, Facebook, WhatsApp, Google group and Nairaland group. The findings of this study was in agreement with the findings of Yen-Ting and Min (2012), Ajuzie and Ukegbu (2015) who aimed at determining the levels of usage of web-based applications in instructional delivery in institutions of learning. Furthermore, the result of hypothesis one revealed that there is no significant difference in the mean responses of male and female lecturers on the usage of restricted access web-based applications for instructional delivery in Rivers state on the bases of gender.

The result of research question two (Table 2) showed that male and female lecturers in tertiary institutions in Rivers state made low use of non-restricted web-based applications such as e-portal, RSSFEED, Wiki, YouTube and Blog. This agrees with Yen-Ting (2013), Andrea (2015), Ajuzie and Ukegbu (2015), who affirmed that usage of web-based application for in teaching and learning process instead of the conventional classroom/laboratory scenarios is aimed at improving the quality of education accessible to the learners. According to Anyaogu (2012), and Ajuzie and Ukegbu (2015), application of ICT in education can only be improved when the numerous hindrances to its usage are tackled. The test of hypothesis two showed that there is no significant difference in the mean responses of male and female lecturers on the usage of non-restricted access web-based applications for instructional delivery in tertiary institutions in Rivers state on the bases of gender.

Conclusion
Based on the findings of the study, it was concluded that male and female lecturers in tertiary institutions in Rivers state make low use of web-based applications in instructional delivery. Information and communication Technology is rapidly introduced in instructional delivery especially in the form of web-based applications. The needs for web-based applications has widened as result of manpower requirement in Rivers state. It is expected that web applications will improve educational rating of Rivers state when fully integrated in teaching and learning process. Therefore, to place Nigerian tertiary education at pal with most tertiary institutions in the developed countries of the world, usage of web-based application must be encouraged in our tertiary institution and this will go a long way to enhance quality education.

Recommendations
In order to attain the maximum benefits of Web-based applications in instructional delivery, the following recommendations are hereby given:
i. Lecturers in tertiary institutions in Rivers state should be provided with web-based applications to facilitate and improve quality education, build the required manpower and provide platform for improved teaching method.

ii. Special training on web-based applications should be given to the staff of tertiary institutions in Rivers state to enable them master the best development strategy for web-based applications.

iii. Improved, sustained and affordable electric power supply and ICT equipment should be provided to tertiary institutions in Rivers state.

iv. Government and institutions of higher learning in Rivers state should advocate for proper integration of web-based application in delivering quality education and the passage of web used bill to checkmate web security in Rivers state.

References


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