

**THE PROMISE AND REALITIES OF WEB-BASED APPLICATIONS IN THE
NIGERIAN EDUCATIONAL INDUSTRY**

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Abstract

This paper focused on the Promises and Realities of Web-based Applications in Instructional Development in Nigeria Educational Industry. It stems from the fact that we are now in the jet age, and of course information and communication technology era when varieties of instructional approaches are available for school teachers to explore and judiciously utilize during instructional development and result preparation. Modern school libraries have print and non-print media resources which houses various information for users to access for various purposes, including computer-related information. This article addressed the need for teachers and students to explore the advantages of Web-based technologies and make them workable in facilitating teaching and learning encounters including result management and recommends adequate use of web-based designed courseware for teaching and learning, especially the science-based subjects.

Keywords: *Educational industry, Instructional development, Web-based application*

Introduction

Influenced by the belief that education should pass on what great minds have already discovered, scholars have emphasized the need for knowledge acquisition. This has generally resulted in greater school accountability, better content learning by students, a greater focus on academics and efficient result management in schools. Nonetheless, learners' weaknesses in self-directed abilities to learning, creativity, and critical thinking skills are some shortcomings faced. Thus, due to the challenges of a knowledge society, the world economies are increasingly promoting the use of educational technology as a way to enhance problem-solving abilities, lifelong learning skills, creativity and inventiveness of students (Kozma, 2016). These personal qualities are seen as essential to future national economic development. The web-based method is advocated for in our time, among other alternative techniques, to solving Nigerias' numerous educational problems. The web-based design system is usually used to describe the process of design relating to the front-end (client-side) design, which includes the writing of markup. Web designs somewhat overlap with curriculum design in the broader scope of web development (Onyejemezi, 2019). Most secondary school teachers are still having challenges, especially in using web-based design and web development in developing instructional packages, and also challenges with computation and management of students' results. For example, the ICT departments of most schools and colleges in Nigeria, are still using Microsoft excel in computing and managing students, results. There are a lot of manual and repetitive tasks carried out by the staff of the ICT department in the result

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computation and management that is prone to error and delay in releasing students' results, hence this article is written to expound on the clarity of web-design concepts and its relevance in education (Eczema, 2007).

Conceptual Framework

Information and communication technology (ICT) is developing at a fast rate and becoming more and more integrated into every facet of daily life, teaching and learning which professionals are challenged with the task of successfully integrating into education(Buabeng-Andoh, 2012). Computers and devices, networks (including the Internet and social networks), applications/tools, and digital content are now being explored by scholars into seeing how they can facilitate the teaching and learning of concepts and, therefore, achieve quality education in this JET AGE (icdl.org). The benefits of Web-based design, an aspect of ICT, can be explored in trying to achieve a better result management system in our schools.

A Web-based design is a term used in describing the processes involved in the creation of websites. The website consists of webpage layout content production as well as graphic design. In other words, it refers to the design of websites that are displayed on the internet which usually refers to the user experience aspects of website development rather than software development (Volery & Lord, 2000). In course of the development and maintenance of websites, many different skills and disciplines are required. Web-based designs are created using markup languages known as Hyper Text Markup Language(HTML) and are normally used to describe the design process relating to the front-end (client-side) design, including writing markup. Web designs partially overlap curriculum design in the broader scope of web development (Onyejemezi, 2019). Most secondary schools are still having challenges, especially with the computation and management of students' results. For example, the ICT department of most Secondary Schools is still using Microsoft excel in computing and managing students' results. There are a lot of manual and repetitive tasks carried out by the staff of the ICT department in the result computation and management that are prone to error and delay in releasing students' results. They need to have knowledge and skill in the use of computers via web-based technologies to improve the situation. Teachers need to get involved in web development for enhanced development of curriculum packages, especially in this nuclear age.

The Concept and Importance of Web-based Design

Web-based design is an aesthetic portion of the website and its usability that encompasses many different skills and disciplines in production and maintenance. The different areas of web design include web graphic design; interface design; authoring, including standardised code and proprietary software; user experience design; and search engine optimization. Often many individuals will work in teams covering different aspects of the design process, although some designers will cover them all. The term "web design" is normally used to describe the design process relating to the front-end (client-side) design of a website including writing markup. Web design partially overlaps web engineering in the broader scope of web development. Professional Web designers ought to have an awareness of usability and if their role involves creating markup then they are also expected to be up to date with web accessibility guidelines (Nielsen et al.,2001).

Information and communication technology (ICT) is evolving at a fast rate and becoming more and more integrated into daily activities and virtually all aspects of life. Experts in Teaching and learning are faced with the challenge of successfully integrating ICT and, in fact, web-based

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applications into education. Computers and their resources such as networks devices (including the Internet and social networks), applications/tools, and digital content are now being explored by scholars into seeing how they can facilitate the teaching and learning of concepts and, therefore, achieve quality education in this JET AGE (icdl.org). The benefits of Web-based design, an aspect of ICT, can be explored in trying to achieve a better result management system in our schools.

The art of web design has a fairly recent history with a link to other areas such as graphic design, usability or user experience, and multimedia arts, but is more fittingly seen from a technological viewpoint, from 1998 to 2001. It has become a part of people's everyday lives. It is hard to imagine the Internet without animated graphics, different styles of typography, background, and music. Tim Berners-Lee proposed to create a global hypertext project, which later became known as the World Wide Web in 1989, while working at the European Organization for Nuclear Research, The birth of the World Wide Web was from 1991 to 1993 when text-only pages were viewed by means of a simple line-mode browser. In 1993, the Mosaic was created by Marc Andreessen and Eric Bina. During the period, there were multiple browsers, with the majority of them Unix-based and naturally text-heavy. There had been no integrated approach to graphic design elements such as images or sounds. The Mosaic browser broke this mould (Eczema, 2007). In October 1994, the World Wide Web Consortium (W3C) was created to "lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability." Companies were discouraged from monopolizing a propriety browser and programming language, which could have altered the effect of the World Wide Web as a whole. The World Wide Web Consortium (W3C) continues to set the pace, which can today be seen with JavaScript and other languages. In 1994 Andreessen formed Mosaic Communications Corp, which later became recognized as Netscape. Netscape created its HTML tags without regard to the traditional standards processes. From the period 1996 to 1999 the browser wars commenced, as Microsoft and Netscape fought for ultimate browser dominance. New technologies in the field emerged during this era, for instance, JavaScript, Dynamic HTML and Cascading Style Sheet (CSS). Generally, the browser competition did lead to many positive creations and helped web design evolve at a rapid pace.

In 1996, Microsoft unveiled a competitive browser, with complete peculiar features and HTML tags for the first time. It was also the first browser to support style sheets, which at the time was seen as an obscure authoring technique and is today an important aspect of web design. The HTML markup for tables was originally intended for playing tabular data. However, designers quickly realized the potential of using HTML tables for creating complex, multi-column layouts that were otherwise not possible. At this time, design and good aesthetics seemed to take priority over good markup structure. At this moment, very limited attention was given to semantics and web accessibility. HTML sites were limited in their design options, even more so with earlier versions of HTML Due to this development, to create complex designs, many web designers had to use complicated table structures or even use blank spacers. GIF images to stop empty table cells from collapsing. Cascading Style Sheet (CSS) was introduced in December 1996 by the World Wide Web Consortium (W3C) to support presentation and layout. This allowed HTML code to be semantic rather than both semantic and presentational and improved web accessibility.

Roger (2001) posited that in 1996, Flash (otherwise called Future Splash) was developed. At the time, the Flash content development tool was relatively simple compared to now, using basic layout and drawing tools, a limited precursor to ActionScript, and a timeline, but it enabled web designers to go beyond the point of HTML, animated GIFs and JavaScript. However,

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because Flash required a plug-in, many web developers avoided using it for fear of limiting their market share due to a lack of compatibility. Instead, designers reverted to gif animations (if they didn't forego using motion graphics altogether) and JavaScript for widgets. But Flash became popular among specific target markets to work its way to the majority of browsers to be used to develop entire sites.

In 1998 Netscape released Netscape Communicator code under an open-source licence, enabling thousands of developers to participate in improving the software. However, they decided to start from the beginning, which guided the development of the open-source browser and soon expanded to a complete application platform. This marked the end of the first browser wars. The Web Standards Project was formed and promoted browser compliance with HTML and CSS standards by creating Acid1, Acid2, and Acid3 tests. 2000 was a big year for Microsoft. Internet Explorer was released for Mac; this was significant as it was the first browser that fully supported HTML 4.01 and CSS 1, raising the bar in terms of standards compliance. It was also the first browser to fully support the PNG image format. During this time Netscape was sold to AOL and this was seen as Netscape's official loss to Microsoft in the browser wars. Since the start of the 21st century (2001 - 2012), the web has become increasingly lives. As this has happened the technology of the web has also moved on. There have also been important changes in the way people use and access the web, and this has changed how sites are designed. Since the end of the browsers wars, new browsers have been released. Many of these are open source meaning that they tend to have faster development and are more supportive of new standards (Nielse et al., 2001).

It is, indeed, a massive and systematic project to incorporate ICT, and web-based design applications, into education. Many interlocked strands are involved in it, and different stakeholders need to be stimulated and coordinated to participate in and contribute to this mission. Internationally, the use of ICT in education has evolved from a very technology-focused view to a systematic view that emphasizes the interrelated change in pedagogy as well as organizational culture (Nkweke et al., 2016). Built on the related research and experiences, frameworks for researchers to effectively integrate ICT in schools are summarized as the following (Zhang, 2019):

1.Hardware and infrastructure: Teachers and students need computer hardware and infrastructure to be able to carry out web-based applications. The building of hardware and infrastructure facilities is projected to provide learners, teachers and institutions with adequate computers and their attendant peripherals, network connections, related digital equipment (e.g. printers, LCD projectors, and cameras, etc.) and sporting facilities to allow the widening community to benefit from ICT. These facilities should run smoothly and upgraded based on a regular time cycle

2.Software and services: The provision to learners, teachers and educational institutions with educationally valuable software tools, content resources, and related services is key to the advancement of educational systems in recent times. Educational software encloses learning management systems (LMS), course content management systems (CCMS), multimedia and web-based courseware, learning resources banks, computer-assisted testing systems, framework software such as modelling and Microworld environments, educational gateways, educational management systems and other application software. In this era of networking, public service institutions such as libraries to wider communities.

3.Human-ware: This makes for effective use of ICT in instruction and result preparation for desired students' feedback, as well as understanding the pedagogical issues, in this jet age. All

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teachers need to embrace sustainable pre-and in-service training and ongoing job-based performance support in web applications

4.Systematic planning and management: Using ICT and therefore web-based design to transform education entails the methodical planning and management to involve and coordinate related public and private sectors, plan, monitor, and regulate the processes, and guarantee the smooth, cost-effective, and sustainable development of ICT in education. This covers the planning and management at the national, regional, and institutional levels (Chen et al., 2003).

The overall process of using web-based design in result preparation might be greatly influenced by four essential factors: the visions of practitioners and administrators, the available investments to support the missions, the overall social and political systems, and the cultural traditions. According to Chen and Zhang (2018), the frequently used educational software and resources can be classified into the following categories:

1.Computer-Assisted Instruction (CAI) in the form of tutorial or drill practice: These types of courseware were developed both for teachers to demonstrate and present learning content in the classroom and for learners to use at home. In china for entrance to higher-level schools (from junior schools to senior high schools and esp. from senior high schools to colleges and universities) bring about tremendous pressure on students, teachers as well as parents. The tutorial and practice courseware scripted by some famous teachers from famous elementary or secondary schools is supposed to be of high value in preparing students for examinations, thus having great charm to students, parents and teachers. These

2.Web-based learning environment systems: The design and development of web-based learning management systems are currently the focus of many e-learning corporations, More and more schools in China, for instance, are starting to use the web-based learning management system to set up their online courses and virtual communities as well as contain resulting management challenges.

3.Computer Assisted Test (CAT) system: CAT software has also gained great attention because it can help teachers with the creation and implementation of quizzes and examinations and help students to make self-evaluations in their learning

4.Web schools: Some famous and influential schools in China have established their ‘‘Web schools’’ to extend their classrooms to more students and provide them with high-quality mentoring. This model can also meet the needs of the students who are striving to get better scores in their examinations (Cuban et al., 2001).

5.General application software: For example, using MS Word in Chinese and English language lessons, using MS Excel in Mathematics. A so-called ‘‘Four-in-One Project’’ has been in use since 1994 to integrate Chinese character recognition, reading, writing and computer application in elementary and secondary school English language classes.

6.CD-ROM-based and web-based resources banks: Tutorial courseware has limitations in that it usually provides a whole programme for certain learning units and leaves little space for teachers’ flexible instructional design and integration. Under this circumstance, there appeared the concept of ‘‘integral-ware’’, which represents the microlearning objects in learning resources that can be integrated or orchestrated into a lesson plan using a platform tool. Evoked by this conception, many companies in China have developed CD-ROM or Web-based resource banks geared to particular subjects in elementary and schools. These resource banks are composed of such formats of instruction resources as texts, images, audio, video, animations, simulations and the like. Teachers and students can find out the target resources using the provided search tools.

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7.Framework software as tools for teaching and learning: This software is designed to function as a tool for learners' thinking, learning, and teachers' works.

The web-based instructional dimension is relevant to the curriculum of our time because, it improves teaching and learning thus improving a constructivist approach by allowing all-around interaction, transferring of responsibility of learning to the students and enhancing the building of knowledge via interaction including the computation and management of students' results. The need for teachers to be computer literate and have requisite theoretical and practical knowledge in the effective use of web-based computer technology cannot be overemphasized. This will enable them to be able:

- 1.Instructional delivery that will cater for learners' peculiarities
- 2.Design and effective use of web-based result management systems in Nigerian schools and, ensure automatic result computation and management (Dale et al., 2002).

It, therefore, becomes expedient at this time:

-To create awareness in both Nigerian teachers and students of the need to use web-based result management systems in the result computation of students, especially in this information and communication technology age.

- For the staff of ICT departments in schools and colleges to be provided with knowledge and skill in effective utilization of, web-based design and web development to design and develop curriculum remediation packages in various subject areas as well as, a web-based result management system.

-For Ministries of Education need to be aware of the importance of integrating web-based technologies in result computation and management in both public and private secondary schools in the State.

-To create awareness in parents about a new dimension in instructional development and result in preparations for their wards (Nkweke et al.,2016; Chen, 2003).

Web-based Design and Instructional Development

The end product of web-based design is web development (which involves taking a web design and making it functional using web technologies such as HyperText Markup Language (HTML), Cascading Style Sheet (CSS), JavaScript and more. In other words, web development is all about implementing a web design blueprint. Web development is the work involved in developing a website for the Internet (World Wide Web) or an intranet (a private network). Web development can range from developing a simple single static page of plain text to complex web-based internet applications web apps (Nielsen et al., 2001). Teachers and students can undertake testing of web applications before public release. This is to prevent exploits from occurring. Teachers and students require to keep a web server safe from intrusion hence they should be conscious of Server Port Hardening. Many technologies come into play to keep information on the internet safe when it is transmitted from one location to another. These days, TLS certificates (or "SSL certificates") are used or issued by certificate authorities to help prevent internet fraud. Many developers often employ different forms of encryption when transmitting and storing sensitive information. It is vital for everyone today to appreciate that "a basic understanding of information technology security concerns is often part of a web developer's knowledge. Because new security holes are found in web applications even after testing and launch, security patch updates are frequent for widely used applications. It is often the job of web developers to keep applications up to date as security patches are released and new security concerns are discovered" (Campbell & Jennifer,

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2017). As it stands now, the World Wide Web (WWW) has become a major delivery platform for different sophisticated and complex enterprise applications in several domains. In addition to their inherent multifaceted functionality. Web applications exhibit complex behaviour and place some unique demands on their usability, performance, security, and ability to grow and evolve. However, a vast majority of these applications continue to be developed in an ad-hoc way, contributing to problems of usability, maintainability, quality and reliability (Eczema, 2007). Today, COVID-19 is such that has prompted a new world order; a time when scholars need to explore more and more alternative teaching-learning approaches. There is an urgent need for Governments and educational institutions to encourage online education, of which instructional material technicians have long advocated for distance learning using various instructional resources, online education using the internet, computer applications etc. to educate the youths, especially at this time people all over the world are grappling with several challenges: lack of money, hunger, insecurity, learning difficulties, etc.

Web-based Result Management Strategies

The Online Student Result Management System (OSRMS) is an educational portal for Nursery, Primary, Secondary schools and Tertiary institutes. This online portal handles everything from the enrolment of students to making individual results of students available online directly on the school database. School management can tell at a glance how many students are there in the school at any given point in time. The beauty of it all is that it helps you to make your student's results available to them from anywhere in the world provided there is internet connectivity. All they need to do is they must view/print their results from the database.

The Online SRMS performs three basic functions:

- (1) Comprehensive Student Online Database
- (2) Student Result view/Printing from any location
- (3) Archive of student results from the lowest to the highest academic levels. Results can be accessed several years after graduation.

The Online Student Result Management System (OSRMS), therefore, provides the following benefits:

- 1) Student Result Management System turns your manual means of results output to digital over an online hosting platform.
- 2) Archives your school results from the very date you start using it from the lowest to the highest academic levels. and results can be accessed several years after graduation
- 3) Automatically computed cumulative scores and grades according to figures being keyed in:

- Helps you to call up a particular student's result at any point in time.
- Students can still view results several years after graduation.
- Rates your school higher than your competitors.
- Reduces the rate of human errors. E.g. Miscalculation of cumulative scores.
- Automatically awards remarks to students based on grades.
- Parents and guardians can have access to their ward's results/performance in school. This helps to put such a student in check (Volery & Lord, 2000).

The web-based instructional dimension is relevant to the curriculum of our time. This is because, it improves teaching and learning thereby improving a constructivist approach by allowing all-

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around interaction, transferring the responsibility of learning to the student and enhancing the construction of knowledge by interaction including students' result computation and management. Teachers need to be computer literate and have requisite theoretical and practical knowledge in the effective use of web-based computer technology to be able to contain:

1. Instructional delivery that will cater for learners' peculiarities
2. Design and effective use of web-based result management systems in Nigerian schools and, ensure automatic result computation and management (Dale et al., 2002).

Checking Students' Results Using Web-based Design Format

Students require feedback even as they make progress with learning. They would need to check their results from time to time, online. Upon registration, every student is automatically given a student identification number. This number is automatically forwarded to both students and parents. With this ID number, such a student can log in to his platform from any location worldwide, change his password, and view or print his/her results. E.g. Geoffrey can print his end of 2nd term result even after 5 years of graduating from the school. Students do not need to buy scratch cards for this to take place. They already paid for the access (Beeker, 2017). The benefits of Web-based design, an aspect of ICT, can be explored in trying to achieve a better result management system in our schools. Web designs partially overlap curriculum design in the broader scope of web development (Onyejemezi, 2019). Most secondary schools are still having challenges, especially with the computation and management of students' results. For example, the ICT department of Golden Child Secondary School, Ikot Obio Nko, is still using Microsoft excel in computing and managing students' results. There are a lot of manual and repetitive tasks carried out by the staff of the ICT department in the result computation and management that are prone to error and delay in releasing students' results.

Impediments of Web-based Usage in Education

Veteran educational technologists and computer scientists of our time have identified certain potential challenges to the use of web-based applications in the educational industry in Nigeria. These include Lack of network infrastructure, lack of computers and devices, lack of technical support, lack of appropriate resources, lack of teacher training and support, and lack of awareness of the benefits of web-based design in education (icdl.org).

Conclusion

The literature reveals the importance of web-based design in curriculum delivery in recent times. Web-based applications are relevant to the curriculum of our time. This is because, it improves teaching and learning thereby improving a constructivist approach by allowing all-around interaction, transferring the responsibility of learning to the student and enhancing the construction of knowledge by interaction including students' result computation and management. It also revealed that there are few developed web-based learning courseware for teaching and learning in Nigeria. To achieve simplicity, clarity, unity among illustrations, and emphasis on key concepts, educational technology experts and computer scientists recommend the use of web-based courseware learning technology in teaching and learning.

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Recommendations

Based on the findings of this study, the following are recommended:

- (a) Teachers and students in the present dispensation should learn to undertake the application of web-based design and web development in a teaching-learning encounter. They should provide a variety of instructional strategies, provide different resource formats, enhance more efficient administration and management in the school system, improve and extend the teaching and learning environment, enhance access for learners, accommodate individual learning styles, and make it possible for a digital collection of evidence and, provide exciting feedback style to learners, among others.
- (b) Governments of Nigeria and stakeholders in education in the country need to gear effort inadequate provision of network infrastructures, computers and devices, technical support, appropriate resources, train teachers and support ICT staff and, create awareness by organizing workshops on the benefits of web-based design in education.
- (c) Schools at all levels in Nigeria should embrace and support the use of web-based courseware in their curriculum delivery as this will enhance the improved performance of students in especially the Basic science subjects.
- (d) Subject experts should be involved in the process of the development of courseware websites as it has been established that web-design is a team work.

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