

Development and Implementation of e-Board Library Portal for Library Services Enhancement in Hussaini Adamu Federal Polytechnic, Kazaure

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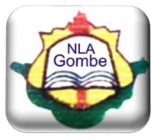
Abstract

This article focuses on the development of e-Board library portal for library's information resources organization and provision, as well as services enhancement in Hussaini Adamu Federal Polytechnic, Kazaure, Jigawa State. The intent of the research is to create platforms through which information contents could be made known and accessible to students and researchers, and encourage teaching and learning activities. Experimental research design was employed for the study. The materials used were Windows Server 2012-R2, Core i5 Lenovo ThinkPad 14-inch Laptop, MikroTik wireless access points router, Apache server, MySQLi database, HTML, CSS, PHP, JavaScript, jQuery as well as Bootstrap 3 framework. The wireless access points covered library structure and 50 meters away on all angles of the library. Two (2) experts in Computer Science and three (3) professionals in Library and Information Science carried out usability testing of the e-Board. The materials used for the testing were wireless access points, Google Chrome and Firefox browsers, laptop computers and mobile smart phones. The usability testing results showed more 70% effectiveness, efficiency, and satisfaction. The results on tasks 1-5 revealed that the e-board was capable of accepting, storing, and disseminating digital information resources, and allows users to use their computer gadgets to access and use the system. It is recommended that libraries in universities, polytechnics, colleges of educations in Nigeria should develop an It is recommended that universities, polytechnics, colleges of educations' libraries in Nigeria should develop e-Board and implement it to reduce the challenges associated with access to and use of information resources and services.

Keywords: Library Portal, Library Service, Information access, Digital library

Introduction

Information resources are considered the blood stream of educational activities. Direct or indirect to access to information have contributed to quality education (Piccoli, 2012). For long, printed information resources have served several purposes in terms of reliability, availability, mobility and monolithic. However, currency, readability, massive and concurrent accessibility have been major challenges faced by printed resources (Shivakumar, 2017). Solutions to challenges of lack of quick access and availability of needed services in libraries are now being provided via web portals, assisted with network facilities and smart phone gadgets for information. Yang, Cai, Zhou, & Zhou, (2016) reported that there have been increment in number of students' enrolment, corresponding with decreasing number of printed books to match with high number of admitted students due to slimming budget,



mutilation, wearing and tearing of available limited number of printed information resources. This similar situation has also been reported in Nigeri by Omosor (2014) and Wada (2014). Worst still, as reported by Wada (2014), the presence of Internet as an alternative to accessing large volume of electronic information resources is characterized with high cost of subscription, erratic electricity and limited bandwidths to satisfy the requirement and demand on the large scale.

Though different solutions could be proposed to the mentioned challenges, the development and implementation of e-Board library portal, which can run on Intranet instead of Internet for fast, easy and all-the-time available accessibility would likely the best option (Yang, Cai, Zhou, & Zhou, 2016; Wada, 2014; and Raol, Koong, Liu, and Yu, 2013). To ameliorate the suffering of students and researchers in urgent need of information resources and to support their educational activities, facilitate the teaching and learning intercourse between lecturers and students, an e-Board system is the best option.

STATEMENT OF THE PROBLEM

Libraries provide information and services in order to inform teachers, learners and researchers of available information resources by disseminating sources and contents procured or acquired. Library also guide and support library clientele to identify, access and utilize the available information resources, sources and services; facilitating accessibility to the available information resources; facilitating charging and discharging activities in respect of printed resources, preserving, reserving and weeding information items amongst others. However, conventional method of providing these services have placed libraries behind time schedule, complicate library administration, reduce user satisfaction and creating room for clientele to seek information elsewhere other than libraries (Wada, 2014; Khan, 2016; Shivakumar, 2017). The consequence is that, once library users begin to turn away from libraries, their educational pursuit may suffer high quality deriving from accessing organized and filtered information resources and services. Studies by Raol, Koong, Liu, and Yu (2013) and Shivakumar (2017) has recommended that proactive action in creating faster and easier channel for meeting the needs of library users is necessary. Once such system could be put in place, the importance of library would be retained or enhanced and library users would proclaim satisfaction with the services and resources of the library. In response to this, the need to develop and deploy e-Board library portal become more of a necessity than mere desire for infrastructural development in higher institution like Hussaini Adamu Polytechnic Library.

AIM AND OBJECTIVES

Aim

The aim of this research is to develop and implement e-Board system in Hussaini Adamu Federal Polytechnic Library, Kazaure, Jigawa State.

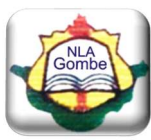
Objectives of the Research

The specific objectives of this research are:

1. To develop e-Board library portal in Hussaini Adamu Federal Polytechnic Library, Kazaure
2. To implement e-Board library portal in Hussaini Adamu Federal Polytechnic Library, Kazaure

Review of related literatures

Presently libraries and similar information disseminating sectors are witnessing waves of different innovations and transformations with regards to how information is generated,



stored, transmitted and consumed Chukwunaza (2019) confirmed that rapid proliferation of information on the Internet, the cost-effective growth of information storage facilities, as well as network technologies are revolutionizing medium of accessing information and how much information could be accessed and consumed, thereby creating unprecedented opportunities for libraries and information brokers. However, the most influencing technologies, which are more being reckoned with are web-based applications, networks and storage facilities.

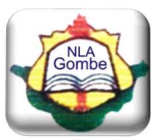
According to Yang, *et al.*, (2016), web-based applications refers to any program that is accessed over a network connection using HTTP, rather than existing within a device's memory. The applications that are web-based more often than not run inside a web browser. Nevertheless, Web-based applications also may be client-based, where a small part of the program is downloaded to a user's computer system whereas processing is carried out over the Internet, Intranet, Extranet or on an external server (Raol, Koong, Liu, and Yu, 2013).

Another important innovation, as noted by Redwood, Thelning, Elmualim, & Pullen (2017) is that information accessibility is now faster and easier in networked environment. The speed, durability and stability of networks are nowadays overwhelming. Improvement experienced in wired and wireless network assures that network capabilities are reliability, dependency, high speed and robustness for communication (Cohen and de Haan, 2010). The notable networks are Local area network (LAN), Backbone, Wide area network (WAN), Value-added network (VAN) and Campus Area Network (CAN). Wired network relies on Twisted Pair Wire, Coaxial Cable and Fiber Optic Cable to operate (Cohen, and de Haan, 2010).

Schwartz, (2013) envisaged that libraries can host their websites, build their respective databases, subscribe to online journals and books, buy a space in the cloud based on demand or desire, develop and implement intranet-based web applications. It is not out of place to state that with such possibility, libraries can offer quality services, enhance library patrons' satisfaction in information search, access and use (Piccoli, 2012).

Surprisingly, many libraries in Nigeria are still finding it difficult to make the required electronic information resources available to their clientele through customised system like Intranet-based e-Board. That is why it is now pertinent and necessary for libraries in higher institutions to develop or implement in-house information storage and management system (Shivakumar, 2017; Cohen and de Haan, 2010; Raol, *et al.*, 2013). An e-Board will help libraries filter out specific information resources necessary for specific group of patrons; cut cost associated with subscribing to Internet or purchasing all needed Books and Journals online; makes information access easy and fast for patrons; makes it easy for dissemination short important information and create forum for immediate contributions of lecturers and students alike in enriching the volume of information needed for educational pursuit (Raol, Koong, Liu, and Yu, 2013). The important of intranet-based e-Board are overwhelming and can be seen in the way intercommunication based or in-house integrated library management system availability in most Nigerian Library institutions.

Electronic Board (e-Board) is a digitally integrated library circuit that marries library activities with library user experience in single interface (Barathi, Loganathan & Rajan, 2017). It is a browser supportive web application that ensure ready-to-post and ready-to-use interactive instance in a highly secured manner. It gives librarians a handy opportunity to provide library services to all kinds of network-enabled computer system and mobile gadgets users within immediate and remote areas. E-Board is an easy-to-use web 2.0 solutions to support communication, collaboration and integrate technology.



An e-Board is considered a type of information systems used to gather, manage, share, and utilize information that has been stored in disparate databases throughout the organization (Sherpa, 2017). Thus, e-Board portals provide users with a single point of access to personalized information needed to make informed business decisions. Portals can bring significant benefits to organizations at both the individual and organizational levels. This is because e-Board portals provide a system that integrate disparate information sources and allow easier access to existing applications within a library institution; and hence e-Board portals allow library staff to find the information and knowledge that they need to do their jobs effectively (Sherpa, 2017). Moreover, portals can further enhance effectiveness by supporting communication between individuals and workgroups; thus, allowing increased collaboration (Yang, *et al.*, 2016). An e-Board portal improves internal operations and collaboration with external partners. Besides, portals can reduce information overload, reduce organizational costs, and enhance employee innovation and institution's intelligence capabilities.

Today, many organizations, especially large ones use portals (Schwartz 2013) as part of their working procedures. Despite the restricted IT budgets of many libraries, investments in portal solutions are the best alternative to encourage in-house information system building (Yang, *et al* 2016). Portal projects are usually considered as complex, time-consuming and cost-throttling, with high risk of failure. Despite this perception, some institutions are ready to invest huge amounts of money in building, establishing and running portals by measuring the actual benefits of their portal implementations (Yang, *et al*, 2016) against the traditional ways of managing information resources.

Portals with the functional features as reiterated by several scholars (Sherpa 2017; Raol, *et al.*, 2013) can supports electronic information resources and services management in any academic institution. This is because functions as "Content Management and Tailorability" and "Searchability" help in retrieving and tailoring portals' information content according to users' needs, which would help them to get the needed information in the needed format that makes it possible to analyze data and produce reports on which they can base their decisions. "Integration" feature helps in getting data existing in different applications and presenting it in an integrated and harmonized manner. Users would access the information needed faster in a way that gives them the opportunity to be more able to make more informed decisions (Yang *et al.*, 2016).

Collaborative tools allow users to get closer to colleagues that make it easier to communicate internally so as to get more insight into course they are learning, to collaborate in order to optimize educational processes and to come up with innovative solutions to their daily challenges. "Accessibility" makes it possible for users to access and navigate portals from wherever they are; this encourages users to work at their convenience and be more innovative when they feel that they can get the information they need easily and effectively, in a way that makes it easier for them to conduct their studies more conveniently. Also, "Security" allows a secured access to information databases, which encourages users to use portals as a tool that provides them with needed information to conduct learning and make informed decisions.

As a single point of access (SPOA) for pooling, organizing, interacting, and distributing organizational knowledge and creating business intelligence, portal is recognised as a safe-system for librarians. Portals are used to synchronize knowledge and applications, creating a single view into the organization intellectual capital (Barathi, Loganathan, Rajan, 2017; Raol, *et al*, 2013). Portals' competitive advantage depends on their abilities to filter, target, and categorize information so that users will get only what they need (Yang, *et al*, 2016). With

organised and customized information resources, library staff would be able to make informed and appropriate innovative decisions in performing their tasks and ultimately, library clientele will be pleased to make library their second home due to ease of access, ready to use and currency of information resources.

Materials and Method

This research adopted Portal Development and Deployment Mode (PDD) as a design. The model was developed by Wada (2014) while creating contents management systems. According to the author, the model consists of eight (8) segments that follow agile designing processes. The author emphasized that the model presents a systemic circle that needs to be followed systematically in the course of developing and deploying portals or websites.

The model is presented as follows:

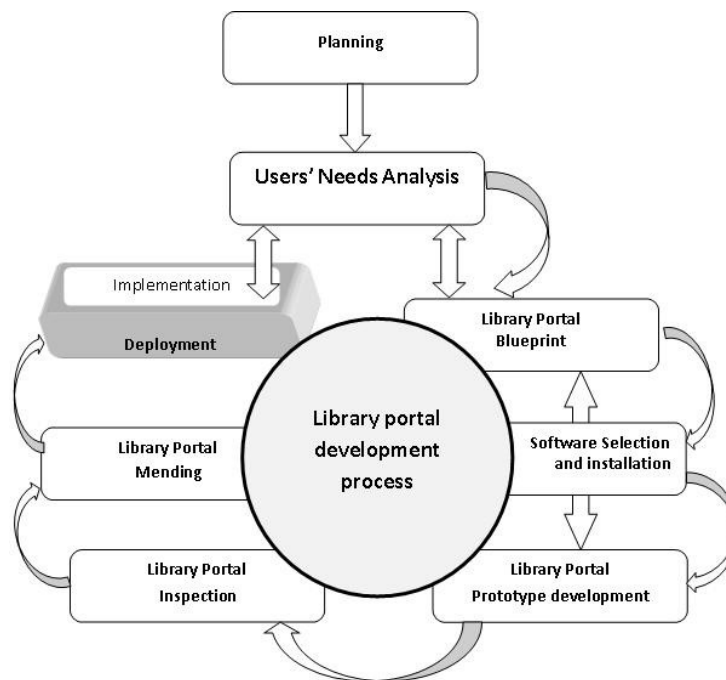


Fig. Portal development and deployment, Wada, 2014)

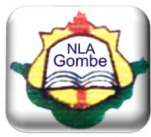
Based on the disposition of the model, the 8 components are planning, library portal blueprint, software selection and installation, library portal prototype development, library portal inspection, library portal mending and deployment (Wada, 2014). The model suggests that following these approaches in website or portal development, would lead to success. In applying this model to the development and deployment of e-Board library portal, the project was well guided for achievement of the designed and deployed e-Board library portal.

Study Area

The study area for the development and implementation of e-Board library portal is Hussaini Adamu Federal Polytechnic Library, Kazaure, Jigawa State.

Applications Materials:

- i. MySQL: My Structured Query Language handles the database instances
- ii. Apache Server: This provides content services on the network
- iii. Cascading Style Sheet (CSS). This facilitates styling and coloring of the portal
- iv. Hypertext Markup Language



- v. JavaScript: This is a scripting language for responsiveness
- vi. Preprocessor: This is a developing language for the behavior of the site
- vii. Windows Server 2012R2: This is the hosting environment
- viii. Notepad++: This is the development environment

Hardware materials

- i. Computer System (server)
- ii. Routers and Switch
- iii. Network cables

Structure of e-Board Library Portal

The structure of the e-Board is basically organized into backend and frontend. The backend consists of administrative access channel for professional librarians whereas the frontend consists of users' access, which include library staff, students, lecturers, administrative staff, researchers, and independent researchers. As depicted by figure 1, the e-Board library portal is divided into two parts: Administrative part (back-end) and Users Access part (front-end).

Basic Functions of E-Board Portal

The e-Board library portal acquires, preserves and disseminates specific information that will:

- a. promotes the activities of the library
- b. enhances educational standard of an institution
- c. informs and entertain all library patrons/clientele
- d. enlightens the general community of an institution on the volumes, types, formats and categories of information materials in the library
- e. enlightens the general patron community Library on the various library services
- f. promotes the image of the parent institution
- g. create forum for interaction between and among students, lecturers and library staff
- h. Creates medium for lecturer-students relations
- i. It will contribute to the wealth of information resources for immediate and remote uses

Front-end and Back-end GUI of e-Board Library Portal

The system is modelled from two usage dimension. The front-end users compose of library staff, students, lecturers, administrative staff, researchers and other registered members. Every user need needs an account and therefore have to register. On the other hand, Back end users comprises Information Technology (IT) librarians and Professional librarians. They are responsible for organizing information resources and deploying the portal for public use. The figure 2 below presents the usage structure of the e-Board library portal.

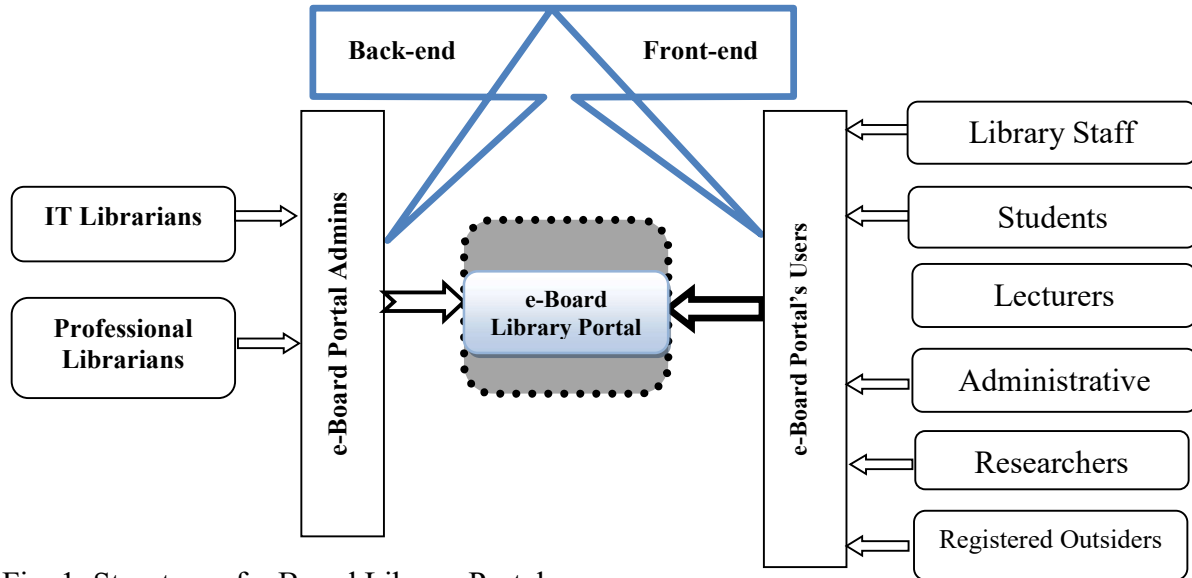


Fig. 1: Structure of e-Board Library Portal

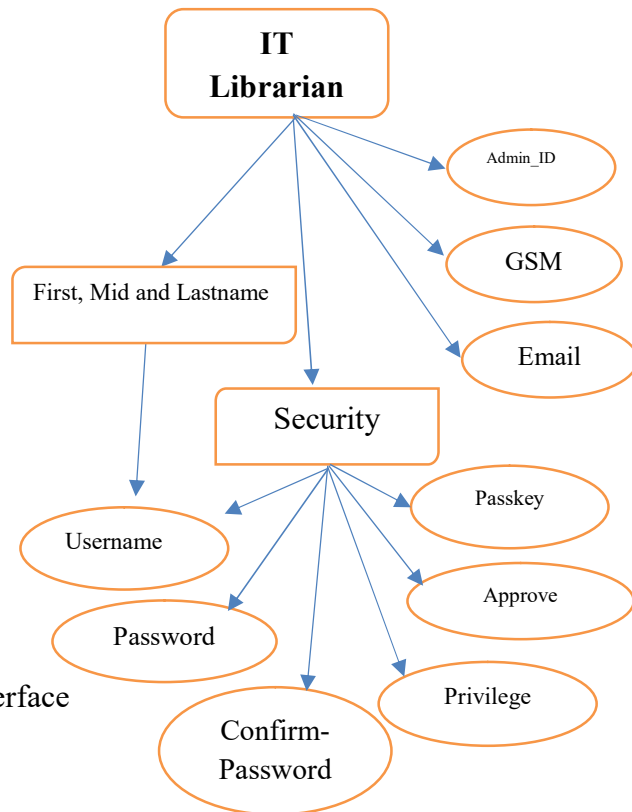


Fig. 2: Entity structure of IT Librarian Interface

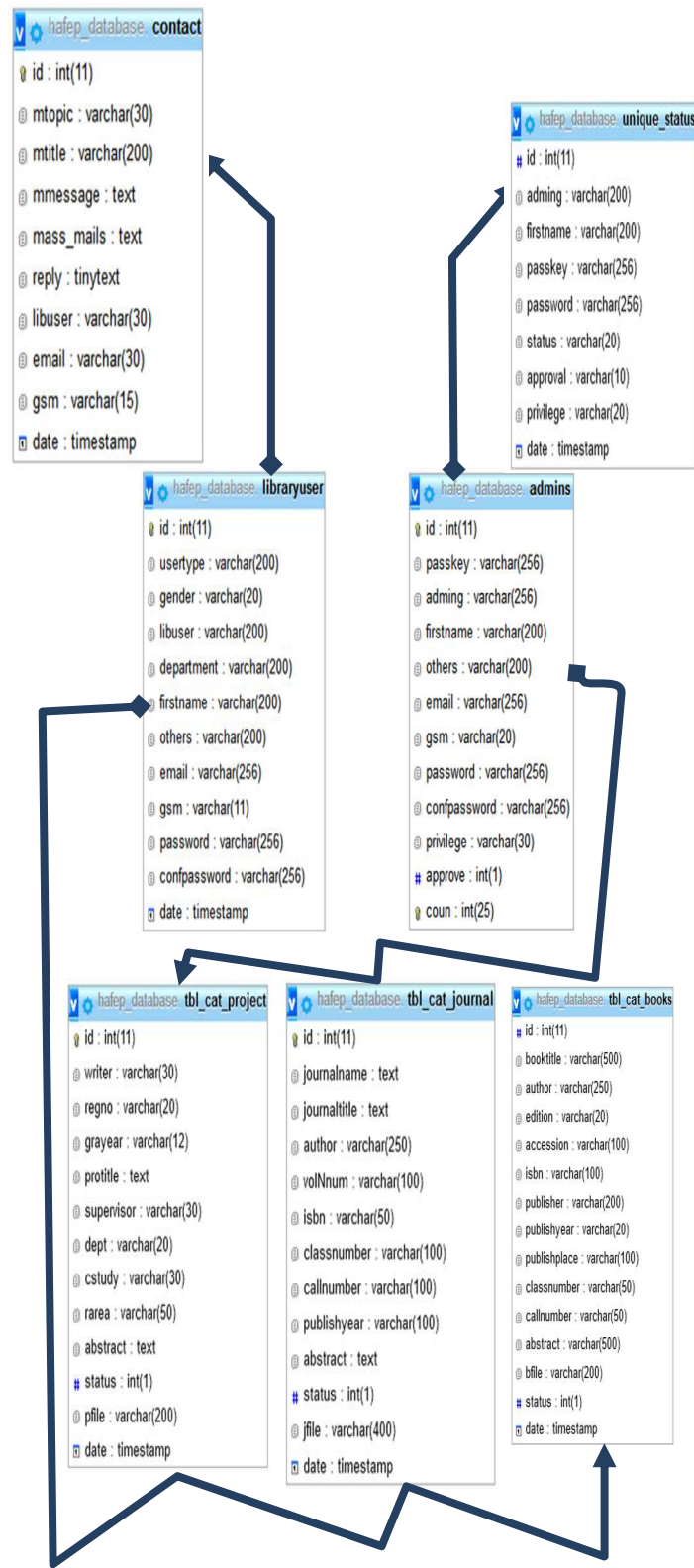


Fig. 3: Entity Relationship Models of e-Board Database

e-Board Library Portal Usability Testing

There are two (2) users of at the backend of the e-Board library portal. The IT librarian, and Professional librarian. The professional librarians are designated to separate the responsibility of managing the three types of information resources under his care. The IT librarians have residual or exceptional right, which are not available to the Professional librarian. The

residual rights are basic unit privilege that prevent duplication and therefore must be reserved to certain highly classified designated office of IT. The figure 2 and 3 below showed Graphic User Interface (GUI) of the backend for the IT librarian and Professional librarian.

IT Librarian GUI

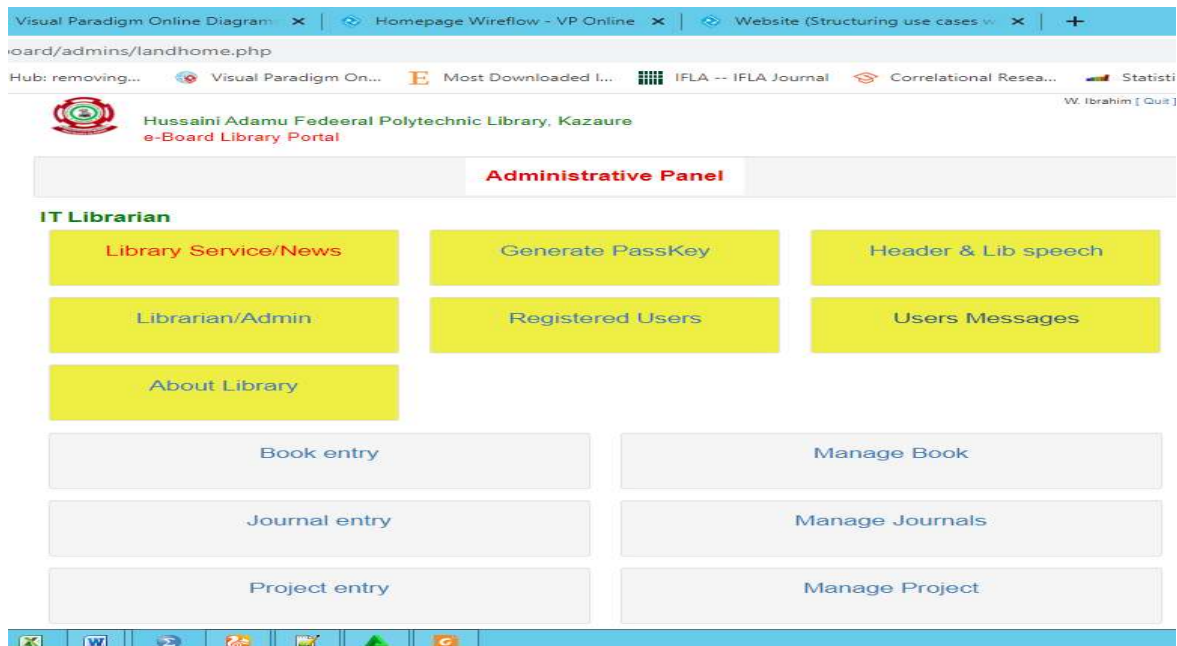


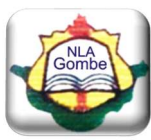
Fig. 4: Homepage of Library Portal for IT Librarian

The functionalities and features available to IT librarian are server (7) as listed below:

- Library News/Service
- Passkey generator/ privilege assignment
- Header and Librarian speech
- Librarian/Admin (site administrators)
- Registered users
- Users' messages
- About library

These modules are used by IT librarian to manage the e-Board library portal. Library News/Service could be used to provide new updates or new services available in the library, passkey generator could be used to create a unique number that a library need before crating new account and as well assign the right or privilege to a newly registered library member. Header module could be used to change or modify the name of the institution along with the institution's logo. Librarian/Admin module could be used to view and delete account of registered librarians. Registered user's module displays the details information about the students and other library users who have registered with the portal. Users' message module provides messages sent by students or site users and the provision for IT or Professional libraries to respond to the messages. About library module deals with the module that allows the IT librarians to provide information regarding the history, services about the library institution.

The second category of the e-Board library portal is the Professional librarian Interface.



Professional Librarian (GUI)

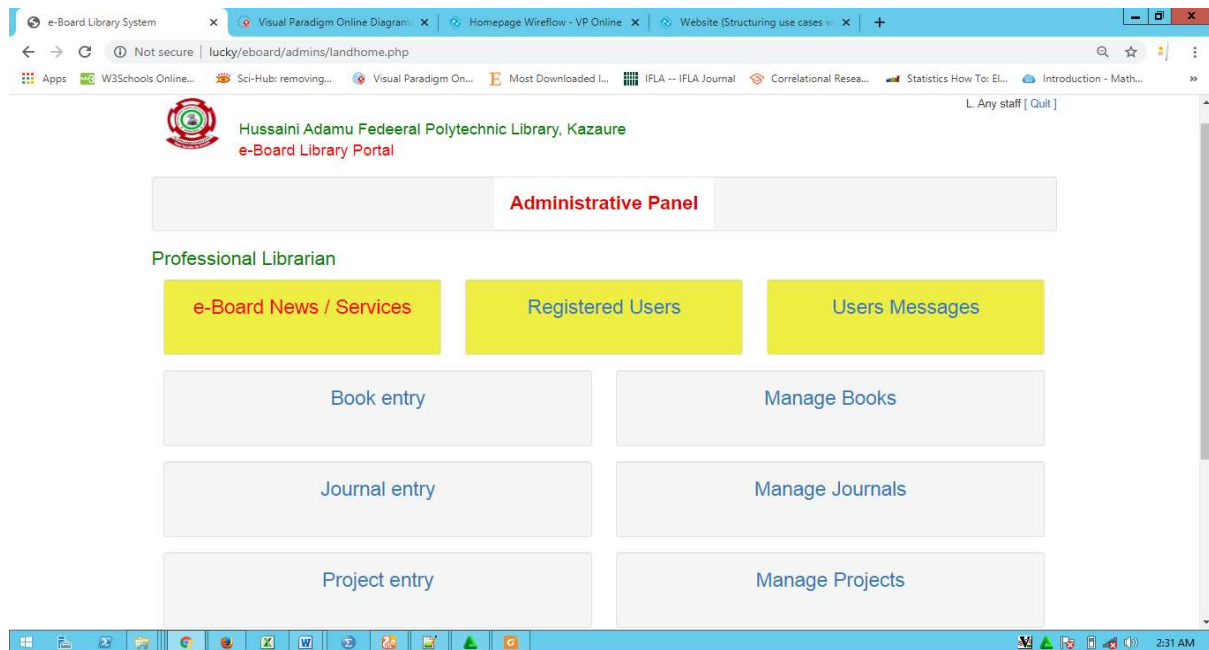


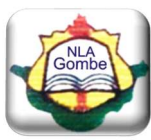
Fig. 5: Homepage for Professional Librarian

The functionalities and feature of e-Board Library Portal for professional librarian also include some features contained in the IT librarian Interface as well as the ones listed below

- Book entry and manage books
- Journal entry and manage journals
- Project entry and manage projects
- eNews and servers
- Registered users
- Users' messages

Library Users Interface

This part addresses the needs of different users composing students, library staff, lecturers, administrative staff, researchers and registered outsiders. The services that are available to them span from access to bibliographic information of books, journals, and projects as well as their digital contents. The interface also provides access to e-Board news updates where sites users can read about any new information from library. The suggestion module lets sites users provide their opinions, point of views, feelings, complaint and appreciates functions. Additionally, the inbox module lets the site users have access to public announcement as well as responses regarding any message send to the librarians by students.



Library users Interface

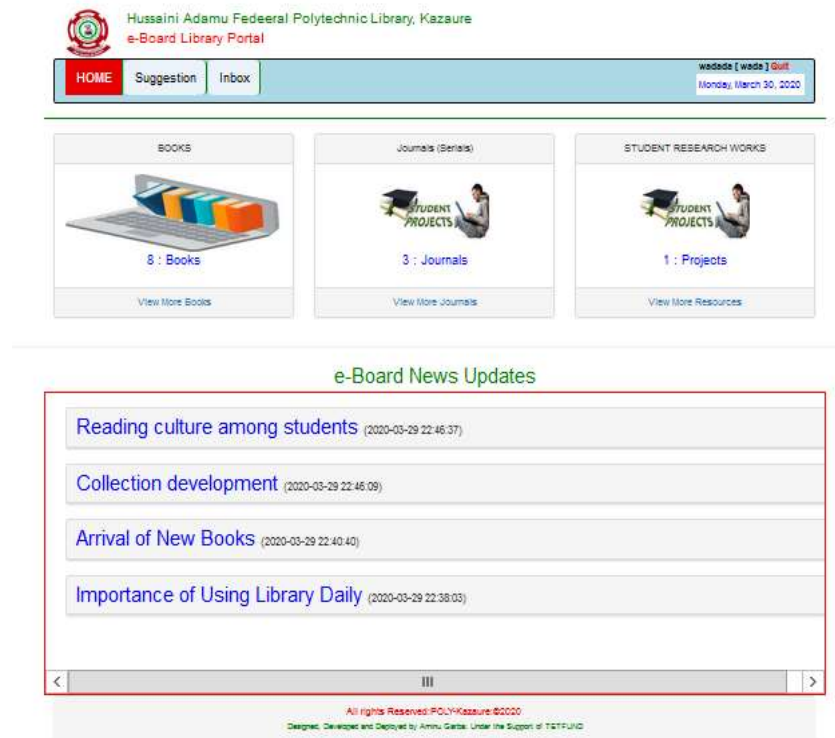


Fig. 6: Homepage for library users

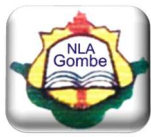
As display in the figure 4, library uses are expected to use their mobile smart phones, laptops, or desktops in the library to connect and access the resources being provided on the library portal. The connection and accessibility to the portal is facilitated through wireless access points, which are open for free and direction connection. In cases where authentication is required, the users are provided with a one-time or semester-based usernames and passwords, depending on the discretion of the library services department. It can also be seen that, three (3) major types of information resources are available: the books, journals and students' projects. The volume, currency and the importance of the information resources fall within the financial powers, ICT skills, and readiness of the library to shoulder such educational responsibilities. It is also important to note that the available of portal services are bounded to the library's operational timings.

Table 1: Usability Testing

Experts	Tasks	Task undertaken	Task successfully completed	Effectiveness	Efficiency	Satisfaction
Computer Science Expert I	5	5	5	90%	84%	92%
Computer Science Expert II	5	4	4	79%	81%	77%
Professional Librarian I	5	5	3	76%	88%	85%
Professional Librarian II	5	5	4	82%	79%	97%
Professional Librarian III	5	4	4	89%	76%	76%

Source: Fieldwork, 2019

The table 1 shows the number of tasks given to the experts, tasks undertaken and successfully completed by the respondents. The rating of the e-board library portal in terms of effectiveness, efficiency and satisfaction after using the application revealed that the application shows significant over 70% rating. This is more than an average rating of



usability. These results recommend that the e-board library portal is usable and could be implemented in the study for which it is developed.

Table 2: Types of Tasks

Task	Statement	Ease of use and flexibility	Efficiency	Satisfaction
1.	Connecting to the e-board via network	5	4	4
2.	Loading browsers and accessing e-board	4	3	4
3.	Using username and password to log in into back-end, computing and uploading information resources into the database	5	4	3
4.	Searching, finding, and downloading information resources	5	3	4
5.	Observing and navigating all the menus	3	3	4

Source: Fieldwork, 2019. Key: Highly poor (1), Poor (2) Good (3) Very good (4), Excellent (5)

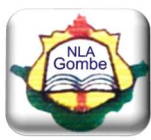
The table 2 shows the responses of experts after they have used the e-board library portal. They were asked to rate their experiences and represent their opinion from very bad to excellence on each task. Three (3) rate the ease of use and flexibility of the e-board library portal as excellent, rate the efficiency as good and four (4) of the experts rate their satisfaction as excellent. These responses confirm that the e-board library portal is acceptable for deployment.

Implication of the designed and developed portal application

The development of this application is in response to the needs of Husaini Adamu Polytechnic, Kazaure other higher institutions that want to manage their information resources. Being developed to avoid complexity in the course of contents management and information organization or knowledge management. This application will boost libraries' services and productivity, increase degree of accessibility to information resources, and facilitate faster accountability and faster reporting.

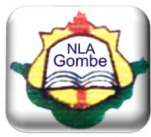
Conclusion and Recommendations

The development and deployment of e-Board library portal was possible by the use of PHP, Apache server, MySQLi, HTML, CSS, JavaScript, Bootstrap framework version 3 and Windows Server 2012 R2. The services are propagated through wireless services, which are made possible through MikroTik Router. The results of usability testing significantly showed that e-board can be used by universities, polytechnics, colleges of education libraries. It is recommended that universities, polytechnics, colleges of educations' libraries in Nigeria should develop e-Board and implement it to reduce the challenges associated with access to and use of information resources and services. Such implementation will improve the quality of teaching and learning, and make easy the provision of services that libraries provide to their clientele.



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