

A WEB PORTAL ARCHITECTURAL DESIGN AND IMPLEMENTATION FOR PRIVATE UNIVERSITIES IN NIGERIA

Ofoegbu E. O.¹, Fayemiwo M. A.², Omisore M. O.², Olanrewaju P. O.²

¹Department of Physical Science; ²Department of Mathematical Sciences

^{1,2}College of Science and Technology, Oduduwa University, Ipetumodu, P.M.B. 5533, Ile-Ife, Nigeria.

Abstract - A web portal architecture for implementation in private universities in Nigeria was proposed and described in this paper. The waterfall model was adopted as the methodology of choice where it prescribes a systematic approach to software development which helps to clearly define both the user and system requirements. The portal proposed was developed using several development tools such as WAMP packages where the Windows platform is the operating system on which the portal runs, Apache is the server, while MySQL was used for the database and PHP as the scripting language. A model of the portal was designed using modeling tools such as Data Flow Diagram (which included student level data flow diagram, lecturer level data flow diagram, administrator level data flow diagram) and the Use Case Diagram. This was preceded by the implementation of the portal to achieve specific objectives such as controlling educational processes, providing access to educational resources, storing user details and information, ensuring security and data integrity, providing a user friendly environment for users and confidentiality.

KEYWORDS: Portal, Web, Modeling, University

I. INTRODUCTION

According to Maedche A et.al (2002), a web portal, also known as a links page, presents information from diverse sources in a unified way. They go beyond static web pages and require a sign-on which links to some knowledge the organization has collected about the visitor. That knowledge allows portals to be tailored to meet individuals need. The business dictionary, enumerated that portals go beyond the delivery of static information and often provide access to services offered by the organization. A portal makes network resources (application, databases, etc.) available to end users. The user can access the portal via a web browser, WAP phone, pager and other devices. Portals include network enabling services such as e-mail, chat rooms and calendars that interact seamlessly with other applications. Most web portals allows for adding personal links as portal providers realize that user may have other interest beyond the organizational boundaries. Personalization will make the portal more appealing to the user, thus a portal allows a user to enter their data space, which can be defined as a space where a user can view and do what he/she wants to do and not what someone else thinks should be done. Examples of web portals are Thrashbarg, AOL, iGoogle, MSNBC, Netvibes, and Yahoo!.

Conventional interaction systems and information dissemination for students and staff (Academic and Non-Academic staff) of a University faces many challenges. Private universities in Nigeria are thus solutions aimed at solving the ills that plague the public universities where inefficient communication/ information dissemination can be regarded as one of those ills. To overcome these challenges there exist the need to develop a portal where students can access vital, relevant university information anytime via the Internet. The web portal as a gateway in the World Wide Web is a starting point for people who are connecting to the Internet. The web portal as the type of knowledge management system provides a rich space to share and search information as well as communication services like content provision for the users. This paper aims at proposing a necessary tool for students in the private universities to help them in getting the required relevant information.

II. RELATED WORKS

A. *The University of Greenwich web Portal*

The University of Greenwich web Portal has been created to make it easier for their students to complete their studies, whilst also enhancing the Greenwich Experience. Students can use the web Portal to access their subject materials online, check their student email, access library services, complete administration requirements and find out about other services offered which are not directly related to their studies and much, much more.

Some useful features include:

- Easy access to administrative and study-related information, allowing students to view and update their personal details online to ensure they don't miss any important University correspondence.
- The 'Information' Directory helps students to locate administrative and study-related resources, policies and information, as well as services to enhance the Greenwich Experience.
- Access to student email account, allowing sending and receiving email messages.
- Access to student notices, allowing students to see the notices relevant to them as well as sending their own notices.
- Access to 'Personal Links'. Save their favorite websites in the 'Quick Links' portlet of the Home page in the Student Portal so they can access them from any computer.

- Links to subject learning tool pages are conveniently located in one place.
- Access to today's weather: a useful tool to help plan your day.
- Front page summaries of students' email, notices and library accounts for quick access.
- Access to library services online. Conduct catalogue searches, view past exam papers and find other key services from one location.
- The student Portal can be accessed from any computer within the University or off-campus at any time provided you have an Internet connection and a University of Greenwich email account.

To use the Student Portal you need:

- PC users: Windows 2000, XP or Vista
- Mac users: MacOS X 10.3.9
- Hardware: 64 MB of RAM, 50-100 MB of free memory space
- Javascript enabled
- Cookies enabled
- If accessing the Student Portal from outside the University, you will need a minimum 56 K modem

You can use the Student Portal on the following web browsers:

- Internet Explorer 6+
- Mozilla Firefox 1.5+

B. Oduduwa University web Portal (Oduduwauniversity.edu.ng)

The Oduduwa university web Portal is not one of the most visited academic portals in Nigeria. It was not created to make it easier for students' to check their grades and register for the semester. The Oduduwa university web portal is STATIC and NOT INTERACTIVE unlike the University of Greenwich web Portal which is DYNAMIC; it was not developed to accommodate lecturers, Alumnae, Guardians and Employers. The Oduduwa university web portal is not a complete university portal and hence the paper attempts to use this as a case study in proposing the architecture.

III METHODS

A. Analysis of Existing System

In the current approach employed by most universities, students have no communication medium between them and other officials within the institution; also there is no provision for an information dissemination medium from the management of the institution to the students. This causes a great problem in keeping records of daily attendance, performance of each student on the side of the lecturer, and there are lots of difficulties for the students regarding interaction with their departments and getting up-to-date information concerning their respective departmental activities.

B. The Proposed System Analysis

The system has been divided into modules where each module is described below.

a. Login Module: The purpose of this module is to provide entry to the system or website. Based on the type of login, the user is provided with various facilities and functionalities. The main function of this module is to allow the user to use the portal. This module provides two types of login —Admin login and Student login.

b. Administration Module: In this module the administrator enters his/her user name and password, which enables access to the administrator page. This page consists of two following sub modules.

- **Student Addition/Updating/Deletion:** Each Student is added, updated or deleted according to his/her department.
- **Notice/Updates/Result Generation:** On the portal, information about notice, attendance and Internal result is generated.

c. Study Material Module: This module provides the feature of access to read/download study materials available on the website. The module could be edited only by the administrator of the web portal. Any student can download the material available at any time.

d. Departments Module: This module gives profile information of various departments associated to the faculties. It gives profile information of all the departments. Anyone can contact these departments through the available complaint form.

e. Students Module: This is a separate webpage for students. They can view, edit, and update their profile from anywhere. It also provides them with platforms to view results.

f. Syllabus Module: The syllabus of various branches associated with different departments within the institution is available here. Syllabus can be viewed and downloaded by the students.

g. Registration Module: This module enables students to register for the semester.

h. Courses Module: This module creates a platform for students to view and select courses to be taken for the current semester.

i. Administration Module: This is a backend for the management, registry, student affairs and other departmental officials to manage student records, requests, and complaints as well as disseminate information to the students and other bodies.

j. Requirement Specification: Requirement specification is a description of what the users of a system will be able to do with it, the functionalities the system should have and how it should react in certain situations.

The expected functionalities of the 'to be system' is indicated below:

- The system should maintain a central base of information.
- The system should deliver all the information about student profile and results to be accessible by various departments within the institution.
- The system shall display syllabus of various courses from each department.
- The system should provide a medium for students to lodge complains.
- Students should be able to view their previous results, read and download books, as well as communicate with administrative officials through available contact forms and get feedback through their profile's email address.
- The system shall provide the school with administrative officials an interface to read and access student request as well as respond to such request in a user friendly manner.

C. Assumptions and Dependencies

Although basic password authentication and role based security mechanisms will be used to protect the web portal from unauthorized access; functionality such as inserting, deleting and updating are assumed to be sufficiently protected under the existing security policies provided by the database system proposed for implementation.

System Development Software Tools

- MySQL database to store and secure information.
- PHP, JavaScript, CSS, HTML to develop the system.
- Apache Server testing the application during development.

System Hardware Development Tools

- Microprocessor: AMD Athlon™ X2 Dual Core QL-66 2.2GHz
- RAM: 2 GB of RAM
- Hard Disk: 160 gigabytes (GB) on installation drive

Operating Systems:

- Windows 7 Home Premium 32 bits Operating System for developing this system.

End-user Characteristics

Every user must have basic knowledge of English.

- He/she should be able to work with computer.
- All users must have his/her unique login name and password to access the web portal.

- The user should know in details of the operation and working of the system.

D. System Design

The system is a web based system that allows multiple access concurrently.

System design is divided into stages:

- Logical design: This is concerned with object oriented modeling of the system analysis.
- Physical design: This is concerned with the construction of the real system.

In the object oriented analysis and design, Unified Modeling Language will be used to model the system where a model is the act of drawing one or more graphical representations of a system with modeling being the process of abstracting and organizing significant features of part of the real world.

E. Design Models

Different models were constructed with unified modeling language using CASE (Computer Aided Software Engineering) tools for proper understanding of the system and also to provide a coherent strategy of the way forward. Such models include Use Case Diagram and Data Flow Diagram.

a. Use Case Diagram: A use case is a story or a case of using a system by some users to carry out a process. A use case describes the sequence of events of some types of users called actors, using some part of the system functionality to complete a process. Each use case then captures a piece of functional requirements for some users. All the use cases together describe the overall functional requirements of the system. The first step in requirements capture is to capture requirements as use cases.

b. Data Flow Diagram: This is a process model used to depict the flow of data through a system and the work or processing performed by the system. In this model, there are four symbols, the rounded rectangle represents processes or work to be done, the square represents external agents, which are the boundary of the system, the open ended box represents data stores, which are sometimes called files or databases, the arrows represent data flows, or inputs and outputs, to and from the processes.



Fig 1: Use Case Diagram for the Proposed System

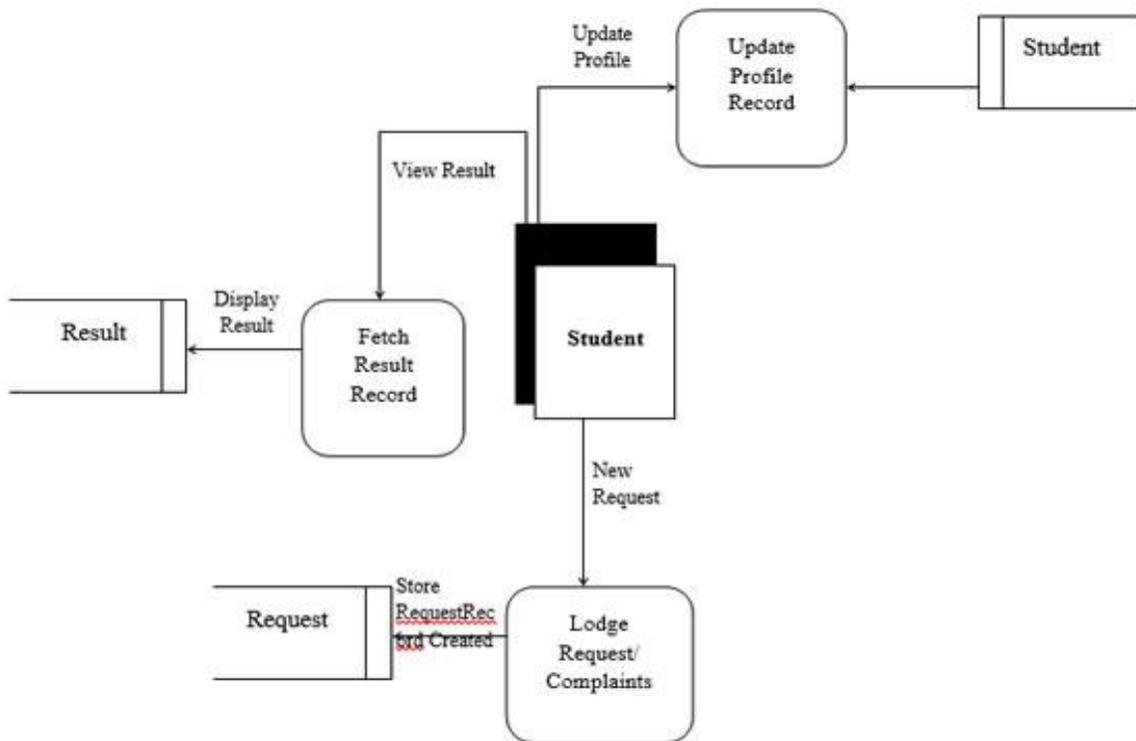


Fig 2: Data Flow Diagram for Student's Level

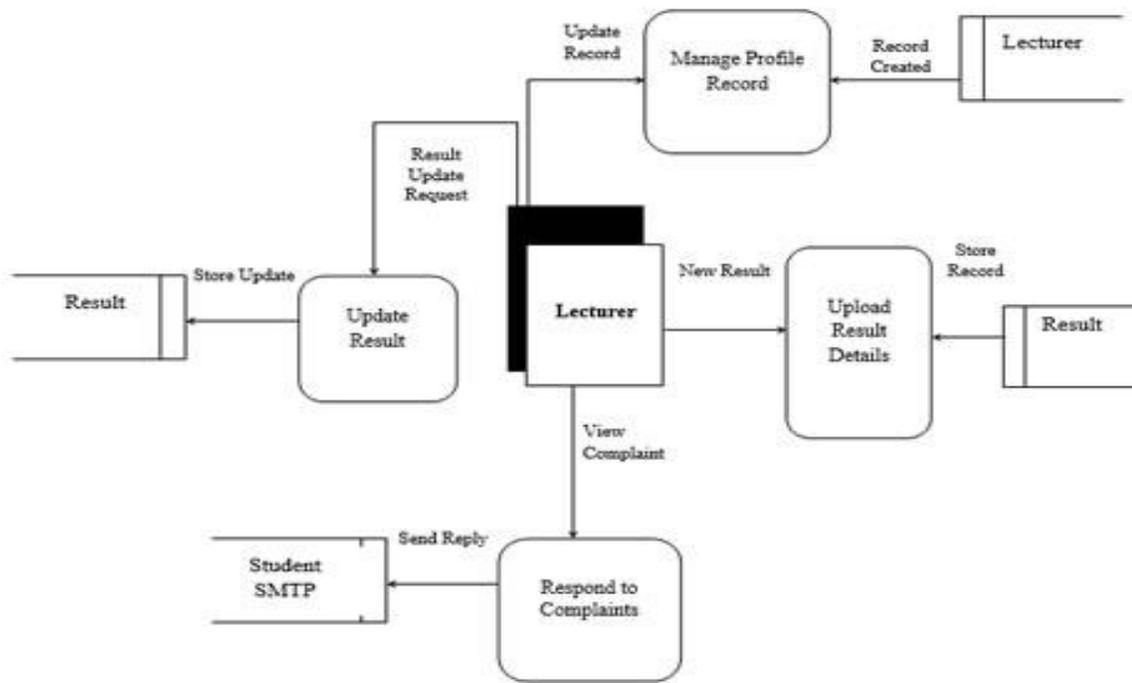


Fig 3: Data Flow Diagram Lecturer's Level

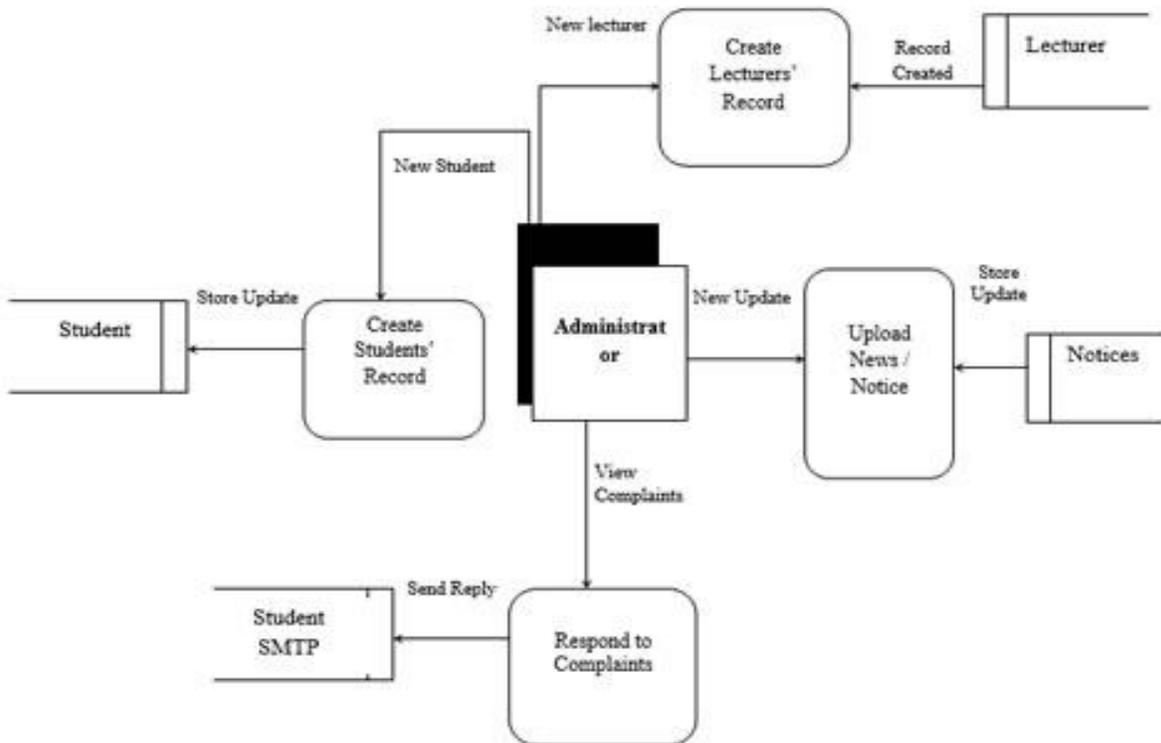


Fig 4: Data Flow Diagram for Administrator's Level

IV RESULTS AND DISCUSSIONS

A. Student Login/Administration Module

Step 1: After launching the system, the student login module is located on the right side of the content.

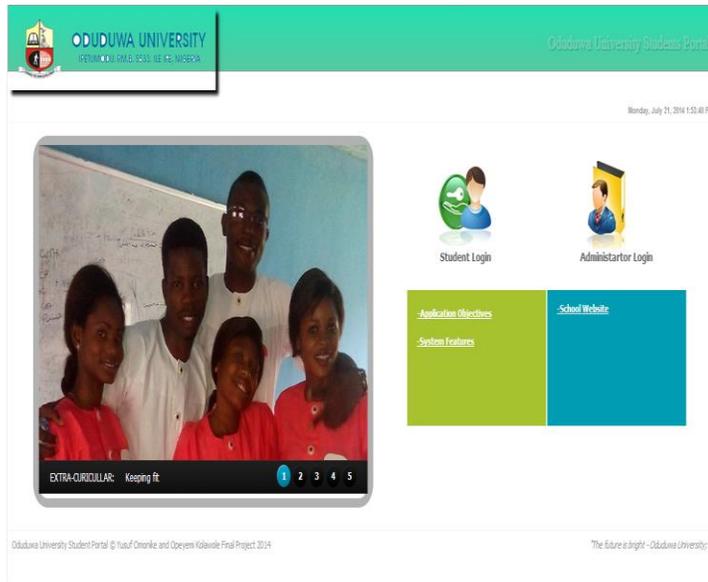


Fig 5: Homepage

Step 2: The login page appears for the student to enter his or her matriculation number and password. Click the “Login” button.



Fig 6: Student Login Page

Step 3: The system test the validity of the login credentials, if invalid, the system remains on the login page with error notification. Otherwise, the system proceeds to the announcement page. Announcements from different departments are displayed.

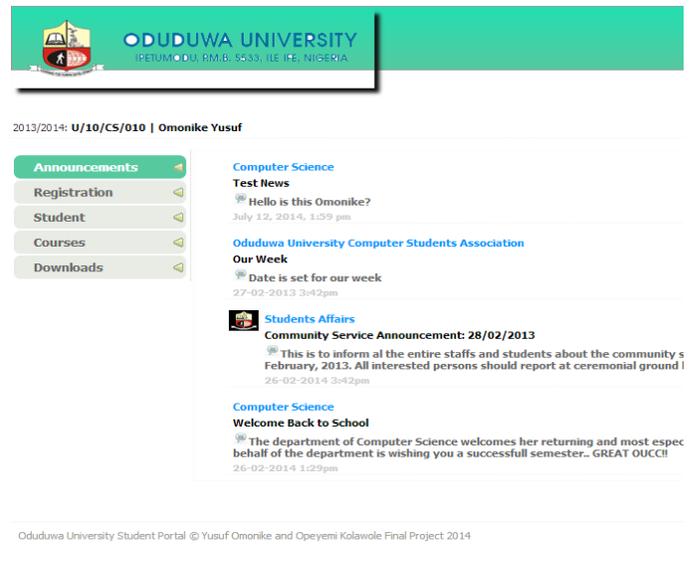


Fig 7: Announcement Page

Step 4: The system allows each student to register for the semester on the register semester page.



Fig 8: Register Semester

Step 5: The account details page displays the student account information, and notifies the student if he or she is on probation.

2013/2014: U/10/CS/010 | Omonike Yusuf

Announcements	Title	Value
Registration	Matric No	U/10/CS/010
Student	Student Name	YUSUF, Omonike Sarat
Courses	Level	400
Downloads	Gender	Female
	Course of Study	Computer Science
	Department	Computer Science
	School	Science
	Religion	Christianity
	Denomination	N/A
	Date of Birth	10/11/2000
	Marital Status	Single
	Nationality	Nigerian
	Address	Test Address
	Probation	Yes: She ate my food
	Session Payment	00.00
	Outstandings	

Fig 9: Account Information

Step 6: The semester result page wraps up all the semesters result completed by the students by semesters and displays it as well as computes the overall CPGA up to date.

2012/2013.2: U/10/CS/033 | Opeyemi Kolawole

Announcements	Semester	Study Level	Total Units	Total GP	Average GP
Registration	2012/2013.1	400	8	35	4.38
Student	2012/2013.2	400	9	36	4.00
Courses					
Downloads					

Fig 10: Student Result

Step 7: The semester result page presents a detailed semester result showing the score earned for all the courses taken for the semester and their corresponding grade and grade point.

2012/2013.2: U/10/CS/033 | Opeyemi Kolawole

Announcements	Course Code	Course Title	Score	Credit	Grade
Registration	CSC401	Database Management II	81.00	3	A
Student	CSC409	Internet Technologies	76.00	3	B
Courses	CSC405	Software Management	77.00	2	B
Downloads					

Fig 11: Semester Result

Step 8: Students have the opportunity using the post mail interface to forward complain or request to any department of their interest, these mails gets delivered to the these departmental request box.

2012/2013.2: U/10/CS/033 | Opeyemi Kolawole

Post Mail

Department:

Title:

Description:

Fig 12: Post Mail

Step 9: The download page presents students with electronic materials to read and download for further reading, these materials are stored based on their categories.

2012/2013.2: U/10/CS/033 | Opeyemi Kolawole

Monday, July 21, 2014 2:29:39 PM | Logout | Change Password

Search: Find material by title, author and category... Search

Sort by Category: Select Category... search

All Materials

ELECTRONIC STUDY MATERIALS			
Title	Author	Category	Download
Best Practices In Software Development	Wrox And Co.	Sciences	
Database Management	O'Reilly	Sciences	
Software Management	J.O Chima	Software Programming	
The CSS Anthology - 101 Essential Tips, Tricks And Hacks, 2nd Edition	Rachel Andrew	Sciences	
Wrox PHP6, Apache, MySQL Web Development	Timothy B, Elizabeth N, Jason G, Yann L S, Jeremy S, Michael K. G	Software Programming	

Fig 13: Download Page

V CONCLUSION

This paper provides a solution to the inefficient dissemination of information/communication in private institutions of higher learning in Nigeria. The inclusion of information technology approaches to optimize already existent practices is to be encouraged as any hope towards achieving the developmental visions of turning the country from an under developed nation to a developed nation can be actualized by the infusion of information technology approaches and technologies. This innovatory architecture can perform the most desired activities of the student in an attractive and user-friendly environment.

REFERENCES

- [1] Tatnall, A. (2009). Gateways to portals research. *International Journal of web portals*, 1(1), 1–15.
- [2] Usability.gov. (n.d.). *What does usability measure*. Retrieved September 2, 2012, from: <http://www.usability.gov/basics/index.html>.
- [3] Maedche A, Stab S, Stajanovic N, Studer R, Sure Y, (2003). *Semantic Portal- The Seal Approach in Spinning the Semantic Web*. London, MIT Press, pp 317-359.
- [4] Pienaar, H. (2003). Design and Development of an Academic Portal. *Libri*, 53 (2), 118-129.
- [5] Pickett, R. & Hamre, W. (2002). Building portals for higher education. *New Directions for Institutional Research*, 2002, 37-56.
- [6] Dane Phillip, (2008). Web Portal and Web Portals Types [online]. Available from: http://articles.webraydian.com/article6353-WEB_PORTAL_and_Web_Portals_Types.html.
- [7] Murray, G. (1999). *The Portal is the Desktop*. California: Intraspect, Inc.
- [8] Goodman, A., Kleinschmidt, C., (2002). Frequently Asked Questions about Portals (FAQs) [Online]. Available from: <http://www.traffick.com/article.asp?aID=9>
- [9] Marjan Mansourvar, Norizan Mohd Yasin, (2010), Web portal as a Knowledge Management System in the Universities, *World Academy of Science, Engineering and Technology*.
- [10] The University of Melbourne Student Portal Guide.

ACKNOWLEDGMENT

We would like to thank the people of Intelligent Systems Research Group, in the Department of Mathematical Sciences, College of Natural and Applied Science, Oduduwa University, Ipetumodu, Ile-Ife, Nigeria, for the invaluable support towards the successful completion of this research.