Design and Implementation of a Web-Based Sms-Notification Clearance System: A Case Study of Federal Polytechnic, Ile – Oluji, Ondo State.

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ABSTRACT
Each year, tertiary institutions churn out graduating students who are mandated to get cleared by different unit of the institutions which is usually done using the manual process. The manual tends to be extremely time consuming and difficult as students have to move from one building to another to know where they have problem. It has also been found to be vulnerable to fraud and other vices. The existing automated system available do not provide SMS-notification functionalities and other services such as non-user-friendly interface, lack of adequate information to user, non-prioritization of processes and so on. This study proposes a system that addresses the issues with the existing manual processing while improving on the identified automated ones. The study adopts a case study approach of a complete manual system for a leading tertiary institution of learning in Southwest Nigeria, with a view to evolving a working prototype. First a thorough understanding of the existing procedure is carried out. A new system that is web-based is built using Hypertext Markup Language (HTML) along with PHP for business logic layer, CSS for proper rendering of display pages of the front end and MySQL for the data layer. The new system will reduce the amount of time and efforts wasted on students' clearance as well as reduce cost incurred on paper by the institution. Another advantage is that students can also initiate and monitor their clearance status from any location they are thereby eliminating the need to travel or be physically present.
Keywords: SMS, notification, clearance, system

I. INTRODUCTION

Every year, tertiary institutions churn out thousands of graduating student who have completed the required course unit and cleared by all nits or departments of the institutions.All activities in a tertiary institutions including learning and teaching are time bound and must be completed within the specified time. Thus, the capability for timely acquisition, utilization, communication and retrieval of relevant and accurate information has become an important attribute for better teaching and learning processes (Adebayo, 2008).

Clearance is an authorization status given to an individual or group of people to have access to important information or right to proceed on an event after completion of a prior event. Using the context of a tertiary educational institutions, a clearance is a compulsory process where all intending graduating students must fulfil before proceeding to the next stage or leaving the institutions. The purpose of clearance in tertiary institutions is to confirm that a graduating student has fulfilled all the necessary requirements (academic, financial, character and otherwise) of the institution before a clearance certificate is issued ahead of academic certificate collection. It is also a proof that the student is not in any way indebted to the institution.

As it is in the educational system of Nigeria, it is after the presentation of clearance form duly signed by relevant authorities that will inform the Registry unit to eventually issue degree results/certificate to the graduating students. Different institutions use different modalities for clearing their students. For instance, in Federal Polytechnic, Ile-Oluji, all intending graduating students are mandated by the institution to be cleared by different unit such as bursary, library, department and registry before been cleared to proceed for the mandatory one-year National Youth

Service Corps (NYSC) programme of the Federal Government. Quite a number of students find the clearing process in their institutions tedious and sometimes might miss the opportunity due to lack of personnel, population of students compared to the workforce available and use of manual clearance system. Several issue was raised concerning the use of manual clearance, according to [2], some of theissues with current manual clearance include:

i. the absence of the admin officer in charge when he/she is needed
ii. there are several units/departments that are required for the students to visit for different stages of clearance in which they must visit at each stage
iii. the process involved in clearance is time and effort-consuming
iv. there are some instances where the clearing officer will intentionally delay the students looking to extort some form of gratification
v. there is a long queue of students during clearance
vi. power failure or technical difficulties in accessing the student record on the system
vii. no notifications of any form to students when a particular stage in the clearance process has been completed

Bearing in mind the above factors presented, there is need to design and develop a system that alleviates all limitations mentioned above.

Objective(s) of the Study

The major focus of this research work is to provide the Federal Polytechnic, Ile – Oluji, Ondo State with a web based SMS notification clearance system (WBSCS) which will involve the following unit of the institution (department, bursary, library and registry) for approval on the portal. This in turn will bring effective, efficient and timely delivering of services that will yield seamless application of students for clearance and improve administrative process of the institution. The primary objectives are:

i. to design a web-based SMS notification clearance system (WBSCS).
ii. to implement the system in (i) (a case study of Federal Polytechnic Ile-Oluji, Ondo State).

Problem Statement/Justification

As issues that surround the issuance of clearance certificate to students such as students having to travel long distance from home to school for clearance certificate at different units of the Polytechnic persist, there is a need to develop a web-based software enabled with SMS alert that will solve the problem of manual method of clearing graduating students in tertiary institutions.

The problems that this project is set to solve are as follows;

i. Automating the clearance process at each stage of clearing (Department, Library Bursary and Registry)
ii. Provision of timely notification to relevant officers that a clearance approval awaits them on the portal in the form of SMS to and also notify the students after final approval.
iii. Reduction of administrative burden on the officers most especially when there is a pool of request from graduating students.

II. RELATED WORK

The proposed clearance system is aninformationsystem as it is supported by anycombinationofinformationtechnologyandpeople'sactivities foroperations,management,anddecision-making.It will becomeaprovenframework and part of the continuous management and improvement of theorganization'spolicies, proceduresand processes. A web-based clearance system with SMS alerts involves the use of Information and Communication Technologies (ICT) for the clearance processes of graduating students in any institution. It basically solves the problems associated with the manual system and thereby makes clearance easier. The method enables student to remotely do their clearance in the institution without physical presence. It helps to save the cost of travelling on the side of the students, jumping from one office to the other and also reduces administrative workload on the relevant officers.

Trying to solve some of the problems that comes with manual clearing prompted the development of a web-based database-driven students' clearance system by Agbo-Ajala and Makindein2015 [3]. The system was developed using PHP and MySQL, and was directed at eradicating the time wasting approach with the manual process of final clearance. One of the drawback of the system was that it could not automatically notify students when they had been cleared in each unit. In related fashion, Usman et al (2016) [4] aimed at developing a software that completely get rid of manual method of clearing graduating students which turn assist them in clearance process without coming to the various department or unit for clearance. The research work was carried out using PHP language, HTML, CSS and the database for the software is MySQL.As such, the system could not address pending status

by the student wh has initiated a clearing process. Different tertiary institutions approach clearing of graduating students. The goal automating the clearing process is speed up and reduce errors during clearing process. Uwakwe and Abode (2015) [5] worked online clearance system for final year clearance using Imo State University as a case study. The project was developed using PHP, JAVASCRIPT, CSS, APACHE and MySQL for the database which was able to accept and process data with great speed and also eradicate the error-prone manual clearance system. One of the pecks of the system was that there was not real-time notification of both students and admin.

In [6], the team developed a secured on-line clearance system for graduating students using finger print technique for security authentication. The software was used by the University of Port-Harcourt in Nigeria. The reason for this research was to provide abetter form for clearance other than the manual process that have been found inefficient. The system had a student registration pageinterface, student login page, to allow the said student to input the matriculation number and a password after which the system launches the student home page where he or she isallowed to make clearance on school fees, departmental and library clearance. The Finger PrintSystem provides student's access to only valid students. It also provided additional security for graduating students to print clearance certificate. The specific objectives of the research work include:

i. to develop a secure database model for on-line students clearance.
ii. to implement the model using PHP – Hypertext preprocessor.
iii. to authenticate the model using finger print as the security technique.
iv. to evaluate the model using time matric

At Quest University, Nawabshah, Zuhaib (2013) [7] supervised a project on the development of online clearance system using ASP.Net programming language to design GUI for the system. The system contain database that had the ability to store details of graduating students for clearance certificate via web pages. Nevertheless, thesoftware is not explanatoryadequate as it does not make availableopportunity for the student toknow which of the units/departments was still pending. It only presents the status as pending.

Idachaba et al (2015) [8] developed a portal based approach system for clearing graduating system automatically. The system allowed authorized admins and student to access their own private portal. The admin can then clear students without the student needing to visit the officer. This system is also configured to send email reminders as well as sms-alerts to all concerned in the process ofclearance. The system was developed using the HTML and PHP packages and MySQL took care of the database. However, the systemhas similar limitation as the one describe in [7] above.

Currently, Federal Polytechnic Ile-Oluji is operating the conventional manual method of clearance for the graduating students. This is not efficient and ICT compliant. There is therefore a need to take the operation online for efficient and effective service delivery. It will provide a safer way of record keeping for future retrieval. The study will helpreduce the amount of time and efforts wasted on students' clearance as well as reducecost incurred on paper by the institution. Another advantage is that students can alsoinitiate and monitor their clearance status from any location they are thereby eliminating the need to travel or be physically present for clearance.

III.   SYSTEM DEVELOPMENT METHODOLOGY

The systems development methodology describes the processes for building the proposed system. Extreme Programming (XP) would be used as the methodology of choice in developing a Web-based SMS notification clearance system (WBSCS) for Federal Polytechnic, Ile-Oluji, Ondo State. Extreme programming is a software development methodology which is intended to improve software quality and responsiveness to changing user's requirements. As a type of agile software development, it advocates frequent "releases" in short development cycles. This is intended to improve productivity and introduce checkpoints where new user's requirements can be adopted. The main goal of XP is to lower the cost of change in software requirements. (Egwunyenga, 2009). Extreme programming is carried out in the following manner; the phases are carried out in extremely small steps.
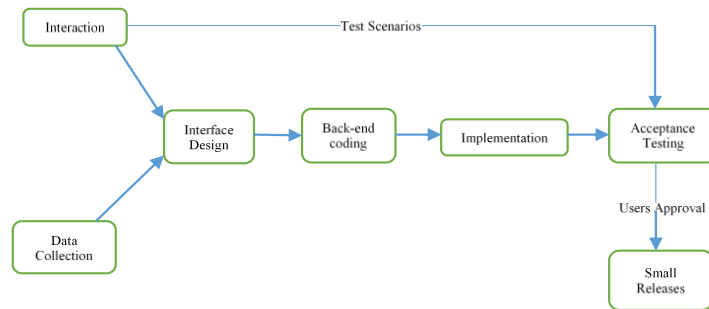
Figure 1: Extreme Programming (XP) Methodology

At the start stage of the project as shown in Figure 1, a comprehensive and detailed interaction will be carried out with the end users of the system and critical stakeholders in the departments, library, bursary and registry units of the Polytechnic. This is to gather the relevant data required to build the system at each stage. Thereafter, the interface designs of the system will be carried out accordingly before advancing to the back-end coding in order to build control for all the specified interfaces. When the back-end coding is completed, the system will be implemented the system testing will be performed by the development team before the acceptance testing will be carried out by the end users. After the acceptance testing and the end users have expressed their approval, then the delivery of the product in small releases will be carried out.
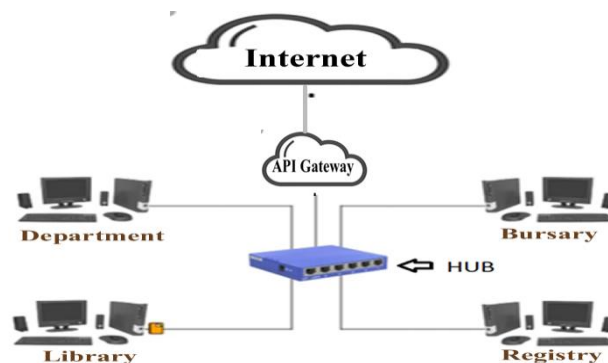
Figure 2: Architecture of the proposed system

In the architecture of the proposed system as depicted in Figure 2, all the application logic and data is hosted on the server. The server process acts as a software engine that will manage shared resources such as databases of the all student details in various department and units such as their Matriculation Number, names, phone numbers, passwords and other required fields expected by each unit.The clients or Personal Computers (PCs) integrated with the presentation layer will use client-end application to request data or processes from the server. The application access and logic reside in the client device while the server stores and provides the core data.

Activity Diagram of the System
The flow of activity will starts from the student module who initiates application for clearance. The admin officer in the department will receives an SMS notification stating that a certain student has applied for clearance. If the student is successfully cleared by the department, his/her details will be transferred to the bursary unit for clearance process else an SMS notification will be sent to the student stating he/she has a problem with clearing process. The student then proceeds to the bursary to resolve the issue. If that has been resolved by the department, details of student cleared will be sent to the bursary module. The admin officer in bursary module clears those who don't have any issue with the bursary unit. SMS notification will be sent to those students who had issues with the bursary unit. Successful students' details will be sent to the library module. SMS notifications are sent to those students who had issues with the library unit. Successful students' details are then sent to the registry module. All students cleared by the registry module receives an SMS notification of successful clearance. The flow of activity goes from the student to the department;

to the bursary; to the library; to the registry and then back to the student. Figure 3 shows a detailed activity diagram of the SMS notification clearance system.
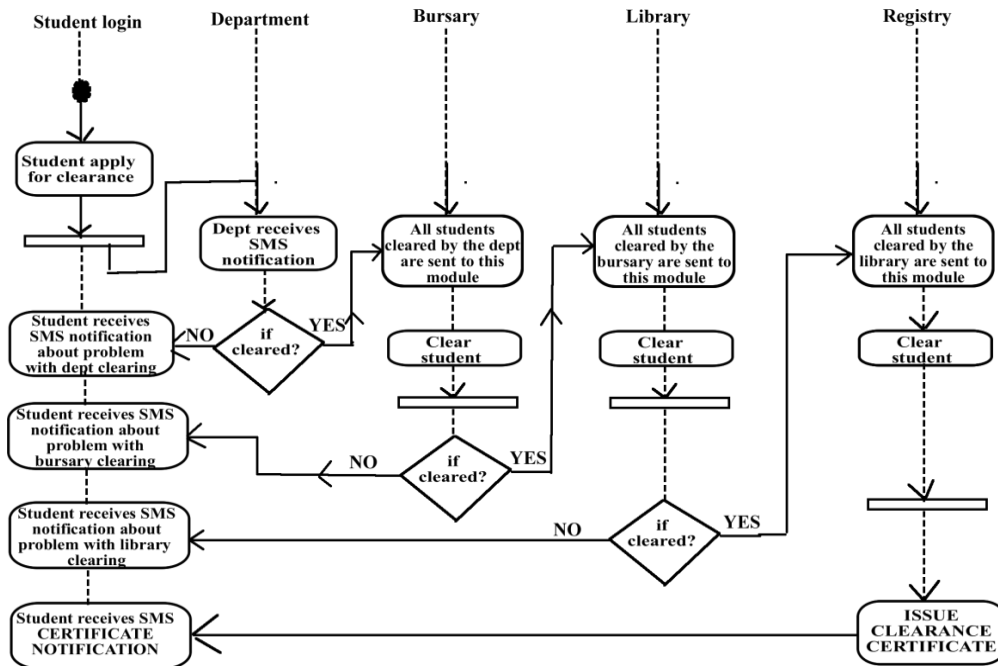

Figure 3: Activity diagram of the proposed system

Software Specifications
Operating System: Windows 8 or Higher
Programming Language: PHP
Database: MySQL

Entity Relationship Diagram

Figure 4 below represents the entity relationship diagram of the application with a full description of the set of objects that share the same attributes, operations, relationships and semantics [9]. The ERP shows that there four (4) entities – ADMIN, REGISTRATION_INFO, DEPT_INFO and SCHOOL_OFFICERS
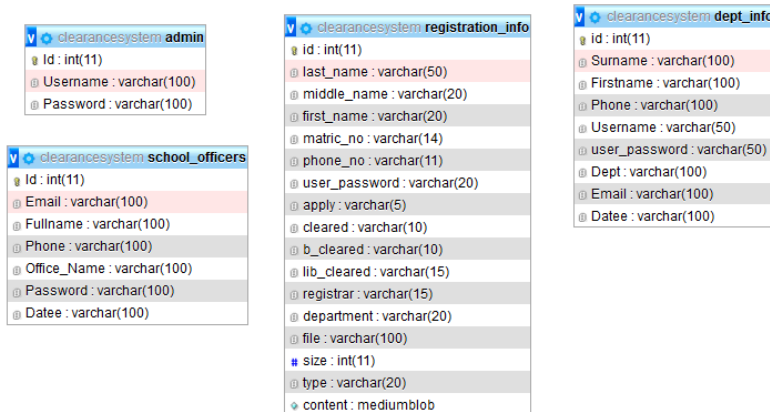
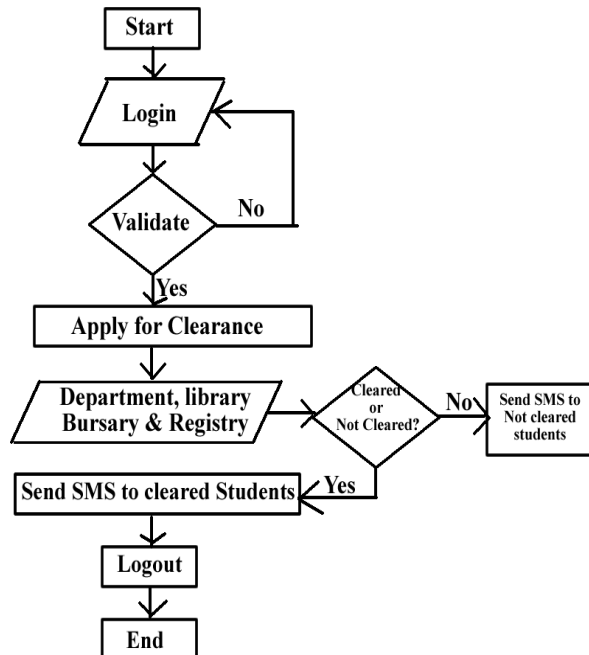Figure 4 below shows the flowchart of the system programming functionality and also the links of the forms.

Figure 4: The WBSCS System Flow Chart

System Implementation

The purpose of system implementation is to create a new system or modify an existing system in compliance to stakeholder's requirements [10]. The system was implemented using HTML (Hypertext Markup Language), PHP (Hypertext Pre-processor), JQuery and MySQL as database.

Figure 5 shows landing page for a student who has not applied for clearance. Immediately the student applies for clearance, an SMS notification is sent to the admin personnel in charge of clearing students in the department. Figure 6 shows the order of clearing status of the student at each unit – department, bursary, library and registry. If students have been cleared in all units, an SMS notification is sent to the student for them to proceed to print their clearance certificate.
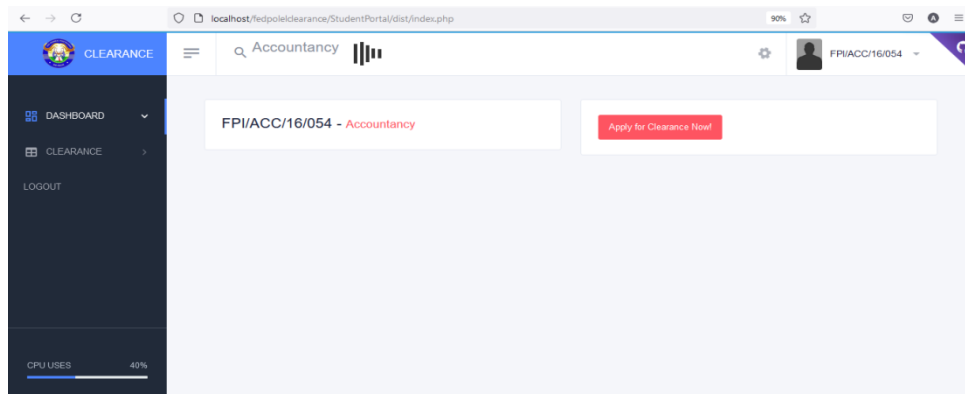

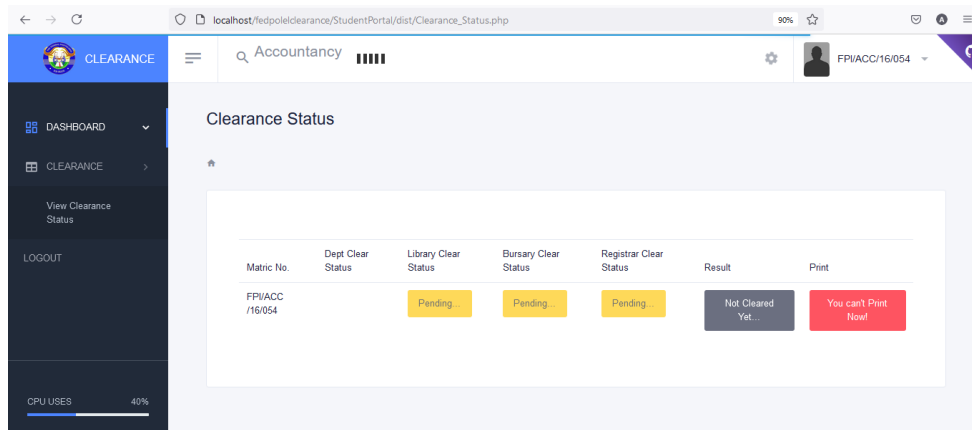Figure 5 –students landing page for applying for clearance

Figure 6 – clearing status of student

Figure 7 shows the landing page for the admin officer in charge of clearing student for the department. The page gives a summary of total number of students in the department, number who have applied for clearance, number of those who have not applied, number who have been cleared and number who have not been cleared. Figure 8 shows how the admin officer can send a SMS notification if a student has an issue in the department, an SMS notification will be sent to the student dial number notifying him/her that there is an issue he/she has in the department. A student with no issue won't receive any message and his/her will proceed to the next stage of clearance.
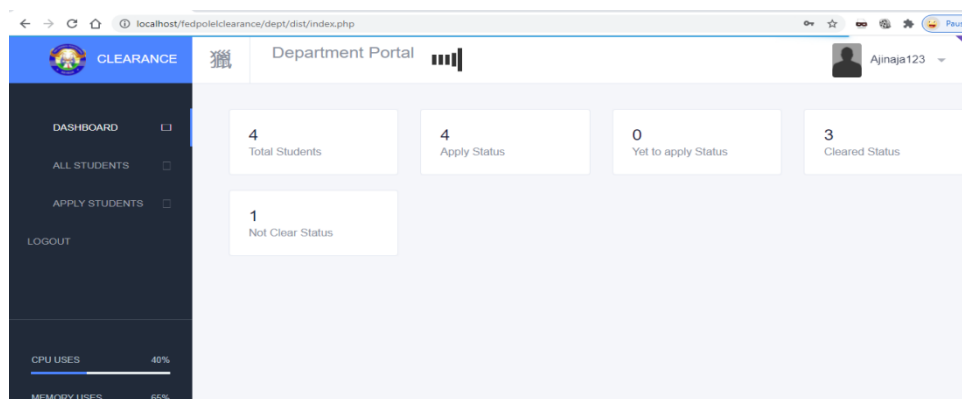

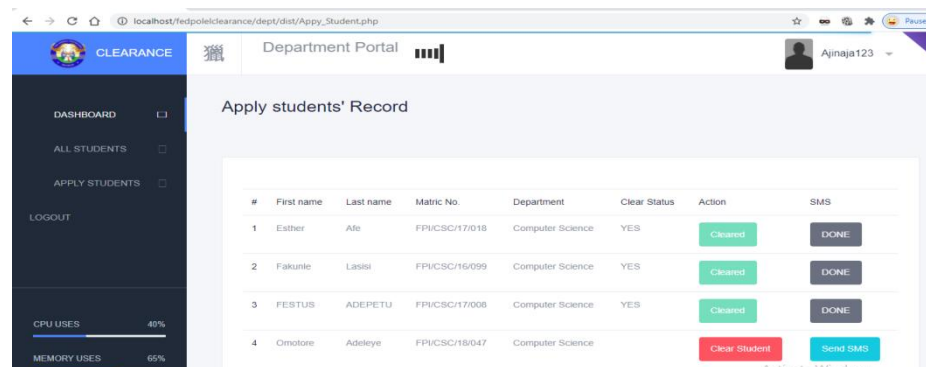Figure 7 – department landing page

Figure 8 – Clearing and Sending notification to students who has problem in the department
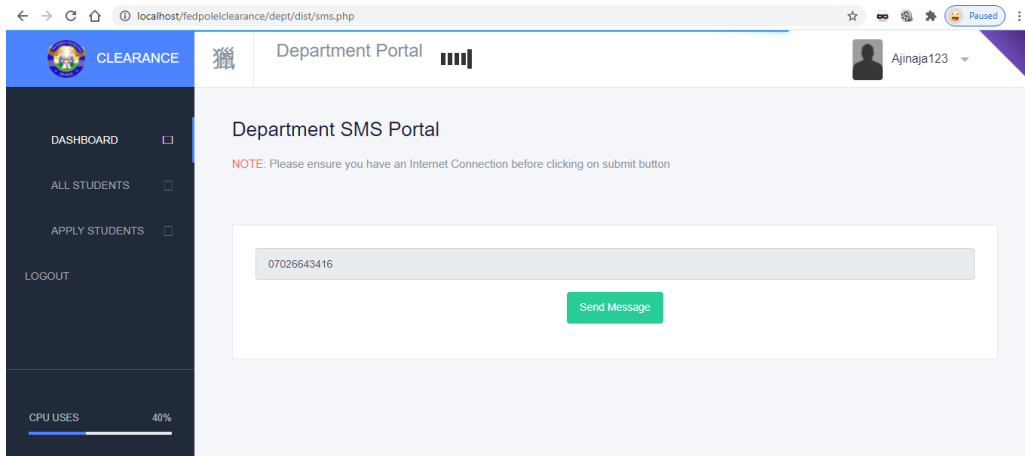
Figure 9 – SMS portal for the department for sending notification to students defaulting

Figure 9 shows the SMS portal for sending notification to students who might have issues in the department. The system automatically fetches the student number and sends a SMS notification. The same format applies to other units – bursary, library and Registry. Each unit has a dedicated dashboard that provides summary of students in each department. Figure 10 below shows the total number of students who have been cleared in each departments.
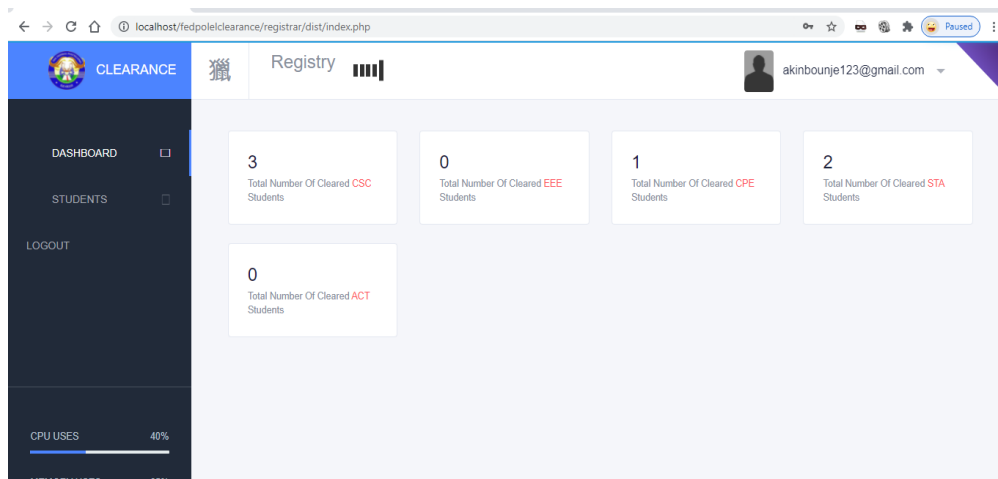

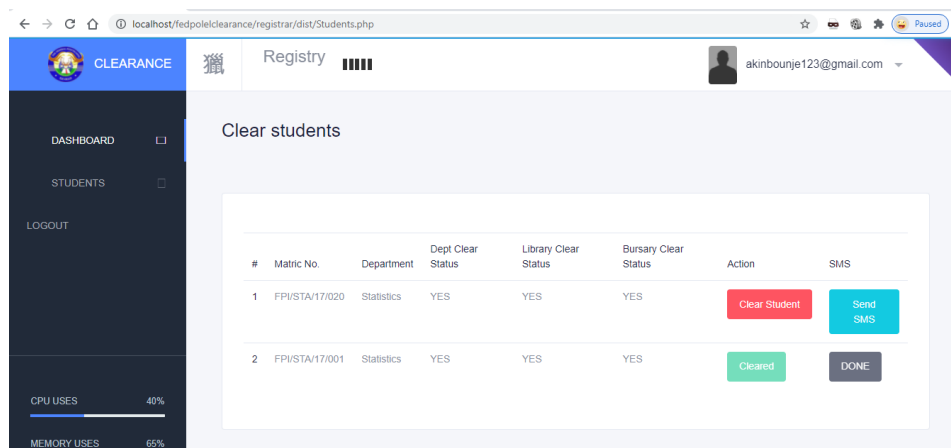Figure 10 – dashboard for the registry unit

Figure 11 – Registry page showing clearing status of each students and SMS notification

IV.   CONCLUSION AND FUTURE WORK

The web based SMS notification clearance system (WBSCS) is a massive improvement on the existing manual system still been use in the Federal Polytechnic Ile-Oluji especially in terms of performance, user friendliness, features and functionalities. The system completely solves some of the shortcomings of the manual system currently been used. The SMS notification system automatically fetches the numbers of the students and sends the message. This is to enable students know which unit they have problems so they can easily attend to it and hasten their clearance. Currently, the application has been deployed on the portal of Federal Polytechnic Ile-Oluji as the case study. The system is a web-based application and recommended for other institutions to save time, cost and efforts. In the future, the system can have a mobile application on both android and iOS with additional functionalities that take care of compelling attributes like convenience and usability and performance.

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