DESIGN AND IMPLEMENTATION OF A ROBUST WEB-BASED CLEARANCE SYSTEM FOR STUDENTS IN NIGERIAN COLLEGES OF EDUCATION

Ekoro Ekoro Igo (Ph.D.)[1] and Bassey Isaac Rajuno (Ph.D.)[2]

[1]Department of Computer Science, Cross River State College of Education, Akamkpa.
Email: eekoro@gmail.com; ekoro.ekoro@crs-coeakamkpa.edu.ng

[2]Department of Computer Science, College of Health Technology, Calabar.
Email: isaacrajuno@gmail.com

ABSTRACT: *Online graduating student clearance systems are important platforms that greatly reduce the tedious processes involved in getting graduating students cleared for certification. These platforms are hardly available in most colleges of education and other tertiary institutions in Nigeria. The existing trends in the student clearance method is that the processes are done by moving from one office to another and having records on paper. Most existing clearance tasks are done manually. This scenario creates a system that is unreliable and confusing to keep the correct track of the records and can be very overwhelming and stressful to say the least. At the conclusion of the academic session, a clearance form is issued to students. Students apply for the clearance form to their respective department if the students need to exit the college. The consequences of this type of clearance system is that, at most times, most of the personnel required for the signing of the graduating students form are often not accessible and this creates serious challenges to the students. Also, in most cases, some of the papers issued to the students go missing in the course of their study and they are asked to pay for dues that have been originally paid. This research presents an automated and robust clearance system that generates students' clearance per session and final clearance to graduating students. Developing an online customs clearance system called a Robust Web-based Clearance System is the major contribution of this research. The system was developed using Java as a programming language. The system was hosted using Xampp as a local server. The system was tested and validated by management and students. The results from the test showed a high level of acceptability of the developed system.*

KEYWORDS: Robust, Clearance, Web-based, Xampp, Online.

INTRODUCTION

Student clearance document in tertiary institutions, particularly in Colleges of Education in Nigeria, is a copy of authenticated students' data form that contain all the details of graduating students indicating that they have been cleared by the college management and the respective departments, and that they are qualified for certification. It is a document that has several sections that must be authenticated with signature by different personnel to ascertain that a particular student is cleared to be attended to by other sections of the institution management such as examination, results computation and certification units. The students' clearance is a measure that is actually used by the college management in making sure that students pay all the required dues throughout their periods in the institution. It can be seen as proof of graduation in most tertiary institutions in Nigeria because, without it, such graduating students are not cleared to obtain a certificate even when the certificate is readily available. In light of the importance of this document, it is therefore vital to the student and the management to deploy a seamless and more user-friendly platform to ease the burden of students' clearance in our tertiary institutions.

According to a study by Oliha (2020), a clearance form is a document granting approval to exit from an institution of study after completing all the requirements of the course of study. Graduating students that have satisfied the academic requirements to graduate must undertake clearance activities leading to their exit from the institution. In the works of Enikuomehin, Olaniyi and Olusegun, (2018), some institutions' data are diverse in nature and are collated and stored in several locations. One of the main bottlenecks associated with these data storage mechanisms is collating them for appropriate usage at the point of need.

In most Nigerian higher institutions, students' information is captured and stored at locations like the examination and records unit, bursary, admission and departmental offices among others for various purposes. Graduating students are expected to visit each of these units and get cleared one after the other before final certification. The process of clearing involves the student's academic department, school as it applies in colleges of education, bursary, students' affairs, library, hostel, sport department, health centers and registry (exams and records) (Adamu, 2022). Clearance is very essential in any academic institutions as students are not only issued their certificate after being cleared by the institution but it also serves as an indicator to ascertain if a student is eligible to graduate, not owing any levy and not in possession of any of the institution's property at the time of graduation. It is therefore imperative for any graduating student of an institution to follow certain criteria in a systematic manner before exiting the system; this is done through the clearance process.

The existing clearance process involves the student physically moving from one department to the other to get their clearance documents endorsed. This traditional clearance method in an institution involves step by step procedures: individual signing of clearance form by the student and to be cleared by the Dean of students' affairs, Dean of Schools, Head of Departments, Head of Sports, Chief Liberian, bursary and registry departments. The step by step process varies from institution to institution. In most institutions, the bursary and the internal audit are the last point of call where final bursary clearance is issued before proceeding to the registry for collection of certificates. The bursary department checks all the financial records of the student based on tuition fees. If there is any outstanding debt, the student must clear all the debt. At the department and school level, a check is carried out to see if all laboratory and departmental materials in the graduating student's possession have been submitted; same applies to student

hostels and sport complexes. It is obvious that the traditional clearance method is time consuming; as such, it takes a lot of time to clear a student in addition to the fact that some key staff may be unavailable to sign the clearance form, which will lead to the student's continuous visits to the same office to sign clearance form. There is also the possibility of loss of documents due to fire or rainfall, hence the need for automated methods that will overcome aforementioned challenges. This study addressed the drawback of the traditional method by developing an online clearance system which does not just produce clearance at the final phase of the student's study but also on a sessional basis. The online clearance system is an effective and efficient internet-based information management system utilized by graduating students of higher institutions to do their clearance online or electronically and affirm that they are not in possession of any property of the institution at the time of graduation.

Statement of the Problem

Students' final clearance is a document that indicates that a particular student is not in any form indebted to the institution at the point of graduation. The current clearance system in Nigerian tertiary institutions, especially the colleges of education, is not only time consuming but tedious. This system of moving from office to office to get their form signed exposes graduating students to unnecessary extortions and bullying from some notorious staff in the institution. In some cases, most of these personnel are rarely available in their offices; this situation has led to some graduating students spending weeks just to obtain clearance before proceeding for certification. It is in the light of this that this research was carried out to address the bottleneck associated with this system.

Aim and Objectives of the Study

The aim of this study is to develop a robust online clearance system for graduating students in colleges of education in Nigeria. The objectives of the study are to:

  i. Conduct a feasibility study on the existing clearance system
  ii. Identify each units of the existing clearance system
  iii. Develop a web-based clearance system and integrate the components of the existing system to the proposed system
  iv. Validate the developed system by subjecting the system to use by the expected users
  v. Use a questionnaire to elicit responses from the users on the acceptability and ease of use of the system
  vi. Perform data analysis on the data obtained from the questionnaire.

REVIEW OF RELATED WORK

Various studies have been carried out on online clearance systems for tertiary institutions. In the work of Fakoya et. al. (2021), a web-based Short Messages Services (SMS) notification clearance system using Extreme Programming (XP) methodology was developed. The system affords graduating students the ability to login with their credentials at their own convenient time, in a timely way to carry out their clearance process in an automated fashion. This clearance system only provides clearance certificates to graduating students at their exit point and not on a sessional basis. This system does not account for the sessional clearance status of graduating students. In the research by Agbo and Makinde (2015), a web-based driven student

clearance system using MySQL and PHP for the purpose of eradicating the bottleneck associated with the traditional method of clearance, such as time wastage, was designed and developed. Though the system was automated, it lacked the features to automatically notify graduating students when they have been cleared. Usman et al. (2015) developed an online clearance system that could be used by graduating students without going to the various departments and units involved in the clearance process. The major shortcomings of this system is that it does not account for the session to session clearance status of graduating students. According to the study by Cadiz, Bondoc and Estroga (2017), proffering an effective and efficient way to facilitate the signing of students' clearance in a private school is by developing an e-clearance system that automates and centralizes the clearance system. The study designed a system to facilitate the quick processing of student clearance, to grant users access to the system remotely, and to save cost and time which the paper-based clearance demands. The system incorporated three actors (students, administrator, and office heads); the system was designed using PHP and MySQL for databases.

According to Ben, Henry and Iriaoghuan (2015), the online clearance system is a project that will help to build a proficient information management system for tertiary institutions. It is aimed at developing a system for making clearance after graduation easy and seamless. The designed software served as a more reliable and efficient measure of undertaking students' clearance, removing all forms of delay and stress as well as enabling users to comprehend the processes involved including how graduating students undertake clearance online. The system was implemented using PHP, JAVASCRIPT, CSS, APACHE and MySQL for the database.

IFeanyi (2013) developed an online clearance system using PHP, CSS, APACHE and MySQL for the database. The designed system presented a more reliable and efficient means of undertaking students' clearance; the system removes all forms of delay and stress associated with the paper-based clearance system as well as grants the user understanding and the guidelines on how to do their clearance online. Ardo (2021) developed an internet-based clearance system to facilitate the queuing system in the clearance process of university. This online clearance system has the features of providing an efficient handling of information that is user-friendly for the university to use since it is internet-based and can be accessed from anywhere and at any time. Usman, Olusanya and Adedeji (2016) developed a system that replaces the manual method of clearance for graduating students and that also helps students to carry out their clearance without going to the various offices for clearance. The implementation of the computer-based system was carried out using PHP, Html, CSS and the database for the software is MySQL. The designed software presents a more reliable and efficient means of undertaking students' clearance; it eradicates all forms of delays and stress. In the research by Kayaga et al. (2021), a digital clearance system for Makerere University was developed; in the study, the major objectives were to examine how final year students' clearance is realized by categorizing bottlenecks in the existing graduating clearing system, classifying the requirements for designing an electronic clearance system for graduating students and designing a digital clearance system for graduating student of Makerere university. The design was both qualitative and quantitative in nature; data were collated through the use of questionnaire and interview guides for students and staff respectively. Observation guides were deployed to analyze the situations within the clearance offices to observe issues such as user and staff behavior at the clearance desk.

Materials and Method

The software engineering methodology adopted for this research was the incremental software development model in collaboration with the prototyping approach. These methodologies were adopted due to the iterative nature of the developed software. The incremental model allowed users to have interaction with the initial version of the system while prototyping was used to create a miniature model of the system.

The clearance system was developed based on a central clearance model where the students report to a central clearance office with the relevant documents each academic session and have their clearance status updated accordingly on the central system.

Alternatively, the system could be broken down into individual clearance units whereby each school unit (library, sports, and other units) has their own interface into the clearance system and the students have to visit each unit to carry out their clearance.

Another alternative is to integrate the system with the fees payment system allowing the student's clearance status to be updated at the point of fee payment. Additional features that can be added to improve the developed system include:

1. Capture of payment receipts using the receipt number
2. Capture of clearance dates for each clearance unit
3. Addition of dashboard for managing faculties, departments and courses
4. Addition of payment verification modules that can help in checking if the receipt presented by a student is valid.

Usage of the Clearance system

1. Create Academic sessions using the "Sessions" option
2. Register a student using the "Register Student" option
3. Manage student clearance using the "Update Clearance" option. To update the clearance status, select the student registration number from the drop-down list, select the academic session, select the unit being cleared (Bursary, library, HOD, and other units) and select the clearance status.
4. View clearance report using the "Report" option. Select the reg. number of the student and a detailed report of the student's clearance status will be displayed.

The clearance table stores information about the clearance status of a student in the various school units.

The Architectural Design

This section gives a description of the architectural design and development of the online clearance system. Figure 1 shows a flowchart depicting the flow of process in the existing system in colleges of education. The system is completely paper-based and requires graduating students to physically visit various departments to get cleared. The graduating student began by checking their graduation status to know if there is any pending course for extension. In a situation where the status of the student is pending for a certain course, the student will not be allowed to proceed for graduation but if the student fulfills all the requirements for graduation, then the student proceeds with clearance by obtaining the clearance form at the student exams and record office. The next stage involves the student physically visiting the head of

department; from there, the student is expected to visit the dean, security unit, sports units and other departments before visiting the bursary to get cleared. It is after clearance from the bursary that the graduating student is expected to visit the registry for certification. The flow diagram for the proposed system shown in Figure 2.
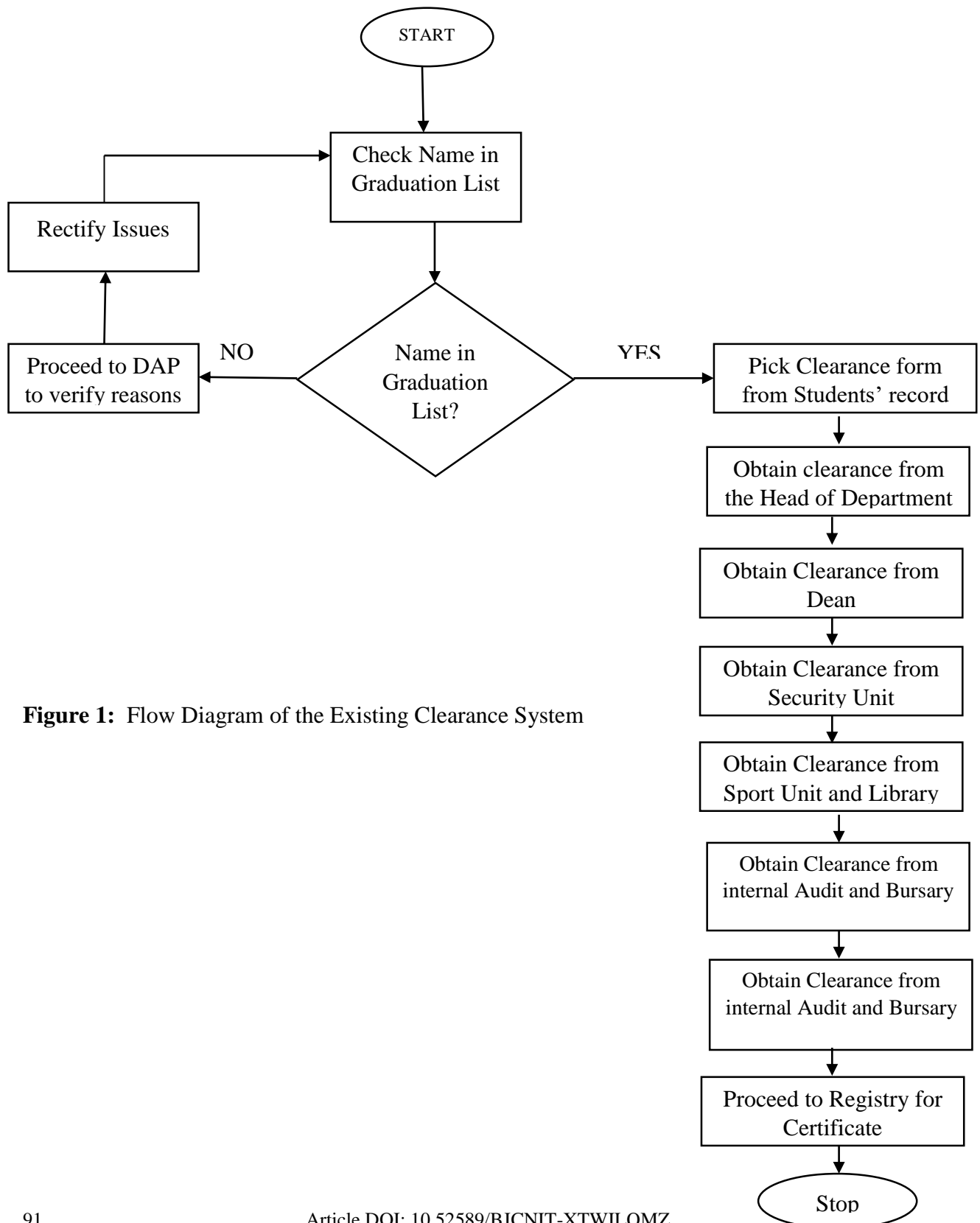

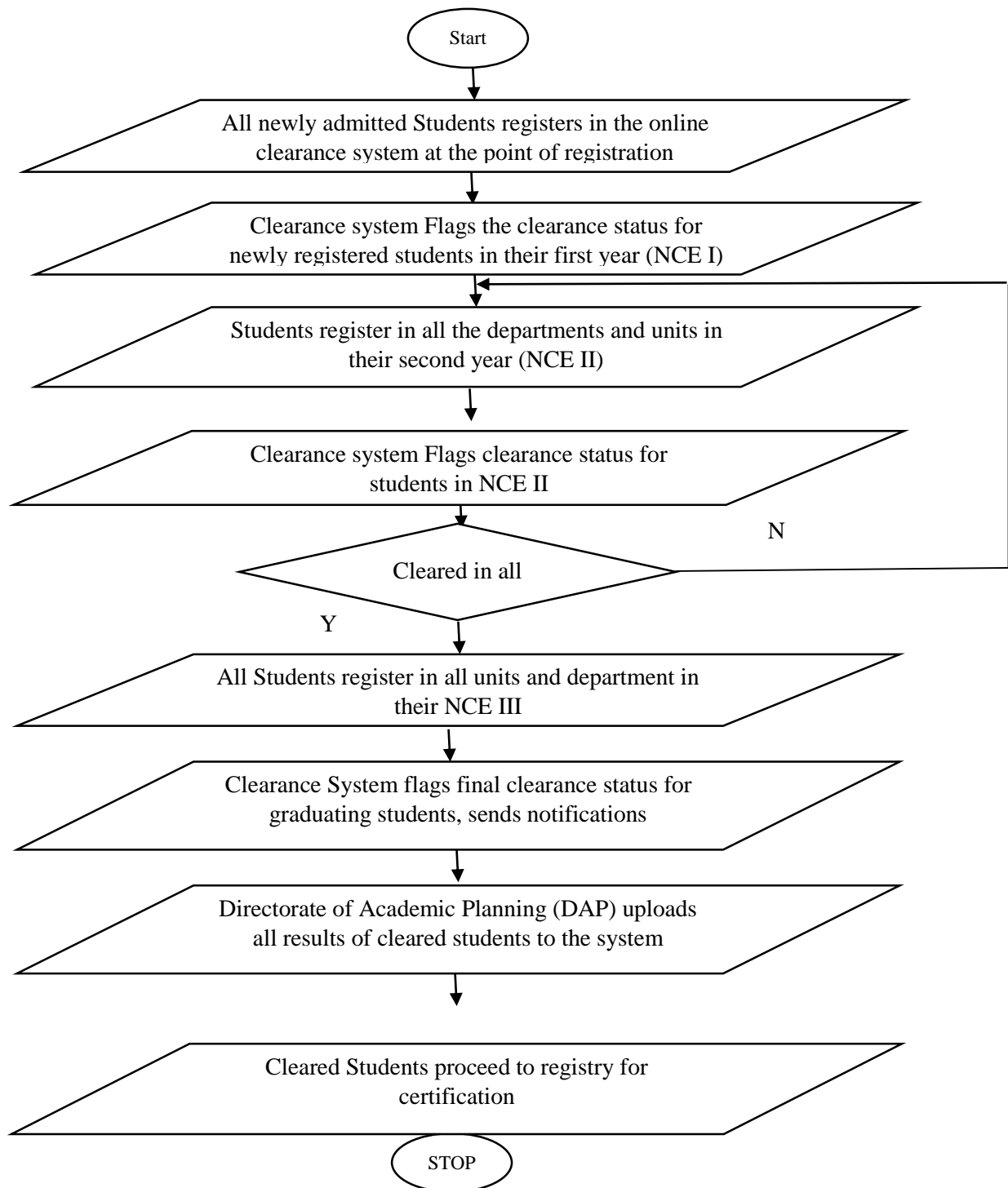**Figure 1:** Flow Diagram of the Existing Clearance System

Figure 2: Flow Chart of the Proposed System

Results of Research on the Design and Implementation of a Robust Web-based Clearance System for Students in Nigerian Colleges of Education

The implementation of the robust web-based clearance system ensures that graduating students spend less time obtaining clearance after fulfilling all the requirements to exit an institution of study. Figure 3a and Figure 3b illustrate the interface for the registration of students in the platform. Figure 4 is the interface for the sessions created on the platform. Figure 5a and Figure 5b illustrate the clearance status of a sampled student.

Figure 3a: Students' Registration Interface

Figure 3b: Students' Registration Interface
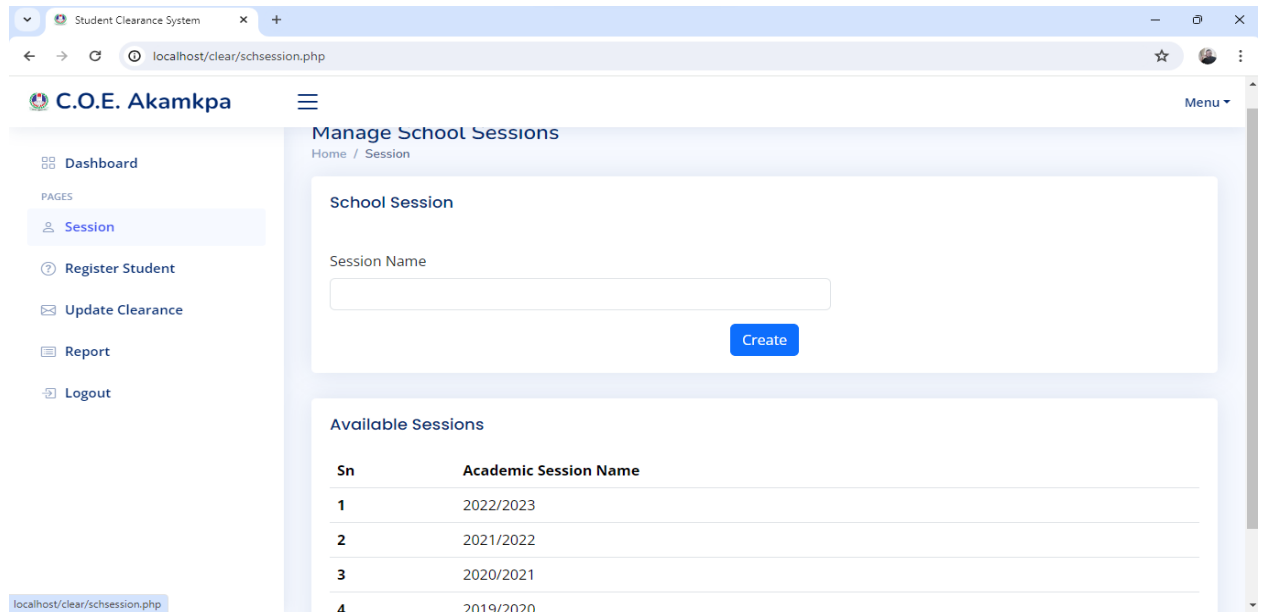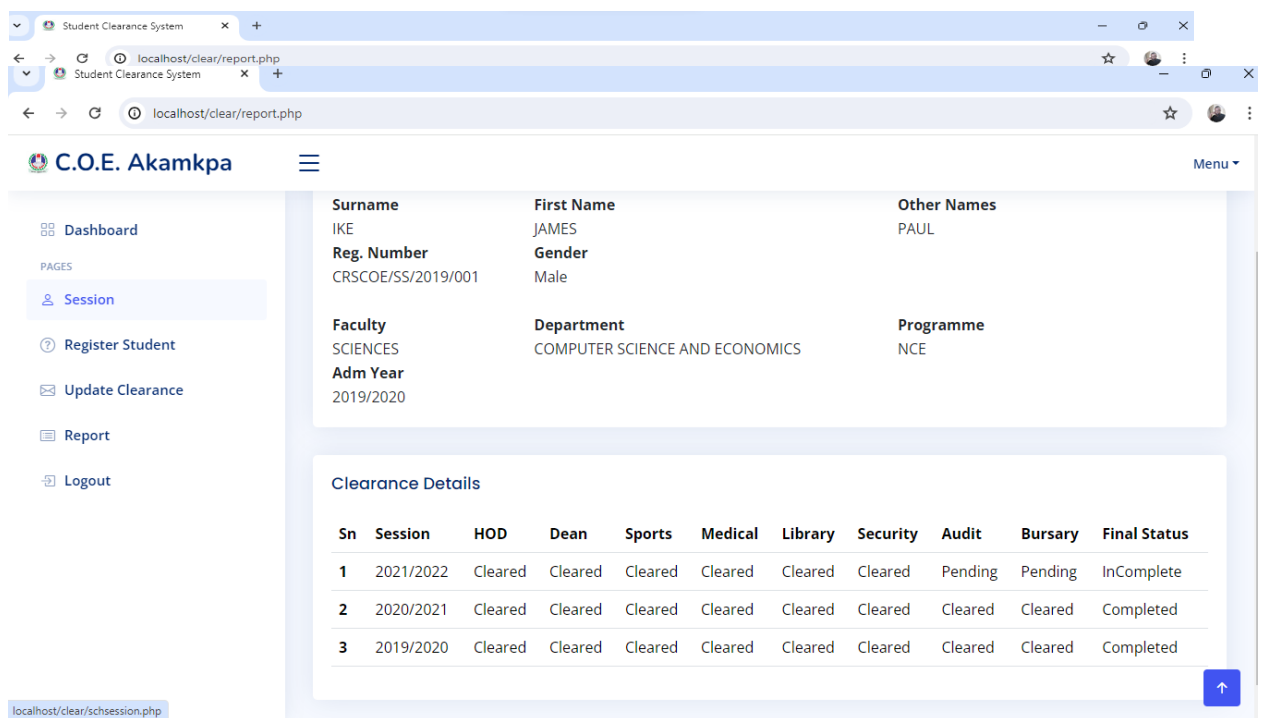
Figure 4: Sessions Interface

Figure 5a: Students' Clearance Status

Discussion of the Results of the Development of a Robust Web-based Clearance System for Students in Nigerian Colleges of Education

After analyzing existing papers and web-based clearance systems and the bottleneck faced by developing countries in adopting these systems to clear graduating students from tertiary institutions, especially colleges of education, the need to create a system that addresses these challenges was identified. Studies such as Grace *et al.* (2018), Umezinwa *et al.* (2015),

Omogbhemhe (2018), Adamu (2022) and Vaishali (2016) developed online clearance systems to address the issues of graduating students. However, the issues of providing a sessional clearance system was not addressed in all the previous work reviewed. To solve this problem, a sessional clearance web-based system was developed to reduce the effect of the occurrence of last minute clearance rush.

CONCLUSION

This research provides a blueprint for solving the annual crisis faced by graduating students, especially at the colleges of education, to ensure that their documents are signed by the recommended authorities. A web-based online platform was designed to facilitate students' clearance seamlessly.

RECOMMENDATIONS

Based on the outcome of this study, it is recommended that:

i. Tertiary institutions should adopt this platform to reduce the challenges faced by graduating students at the point of collecting their certificates.
ii. A more robust platform should be developed that seamlessly integrates the final clearance slip and a sample of the expected certificate.
iii. Biometrics is expected to be introduced to increase the security of the platform.

REFERENCES

Adamu A. (2022). Online Clearance System. FUDMA Journal of Science. 6(2), 283-291

Agbo-Ajala O. & Makinde, O. E. (2015). A web-based database-driven students' clearance system. Int. J. Adv. Res. Comput. Sci. Softw. Eng. 5(7), 65–69 (2015)

Ardo, F. U. (2021). Online Clearance System. (B.Sc.). Baze University, Abuja. Final year student's project

Ben, U. C., Henry, U. C., & Iriaoghuan, A. I. (2015). Design and implementation of online clearance system: a case study of Imo State University. European Journal of Applied Sciences, 7(1), 25-31.

Cadiz III, L., Bondoc, C. N., & Estroga, J. (2017). Moving Towards Global Technological Advancement: Basis for the E-Clearance Program Development. International Journal of Computing Academic Research (IJCAR), 6(6), 171-179.

Enikuomehin, D., Olaniyi, M. I., & Olusegun, A. A. Enterprise Data Integration for Graduating Students' Clearance Processing: a case study of Lagos State University, Lagos, Nigeria.

Eti, F. (2018). The Application of Unified Theory of Acceptance and Use of Technology (UTAUT) in Assessing Student Clearance System. International Journal of Innovative Mathematics, Statistics & Energy Policies, 6(2), 12-16.

Grace U., ianhua D., Sarder S., Happy N., David A. & Ifeanyi D. (2018). An Improved e-Clearance Management System for Graduating Students in a University Environment. 2018 IEEE 9th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)

IFEANYI, O. E. (2013). Design and Implementation of Online Clearance System. Final year student's project

Kayaga, J., Nakkazi, J., Namigadde, E., Ngobi, P. N., Toko, I., & Tumusiime, P. (2021). Digital clearance system for graduating students in Makerere University. Makerere University

Oliha, F. (2020). Evaluating Usability of Academic Web Portals for Clearance Services. Omogbhemhe (2018),

Umezinwa C., Uwakwe C. & Abode I. (2015). Design and Implementation of Online Clearance System: A Case Study of Imo State University. European Journal of Applied Sciences 7 (1): 25-31.

Usman, O., Olusanya, O. & Adedeji, B. (2016). Design and Development of Online Clearance System for Tertiary Institutions: A Case Study of Tai Solarin University of Education, Ogun State, Nigeria. Paper presented at the Proceedings of the iSTEAMS Multidisciplinary Cross-Border Conference, University of Professional Studies, Accra Ghana