Design and Implementation of an Electronic Administration (E-Admin) System for the Registry Unit of Federal Polytechnic, Ile Oluji, Nigeria

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Abstract - **The Registry Unit at Federal Polytechnic Ile Oluji currently relies on manual processes to manage critical staff, student, and council data. This approach is inefficient and prone to errors, emphasizing the need for an automated solution. This project aims to design and implement an Electronic Administration (E-Admin) system to streamline operations within the Personnel, Academic, and Council Affairs sub-units of the Registry Unit. The system was developed using web-based technologies to ensure easy access and seamless integration. Specific modules were designed for each sub-unit: The Personnel Unit manages staff information, the Academic Unit oversees student records, and the Council Affairs Unit coordinates council member activities. A user-friendly interface facilitates efficient data management. The E-Admin system automates key administrative functions, reducing manual paperwork and enhancing data accuracy. It enables effective management of staff appointments, student registrations, and council activities, improving coordination across sub-units. The implementation of the E-Admin system significantly enhanced operational efficiency, communication, and data accuracy within the Registry Unit. By digitizing administrative processes, the system increased productivity and streamlined data management, benefiting both staff and students at Federal Polytechnic Ile Oluji, Nigeria.**

Keywords: **Electronic Administration (E-Admin), Registry Unit, Automation, Data Management, Operational Efficiency**

I. INTRODUCTION

Efficient administration forms the backbone of any educational institution, ensuring seamless operations across various departments while fostering a conducive learning environment. However, numerous institutions continue to rely on traditional, manual methods for managing administrative tasks. These methods are not only time-intensive but also susceptible to errors, inefficiencies, and duplication of efforts [1]. The Registry Unit at Federal Polytechnic Ile Oluji exemplifies these challenges, as its dependence on manual processes hinders the effective management of critical data related to staff, students, and council affairs. These limitations underscore the pressing need for a comprehensive, automated solution to address inefficiencies and enhance institutional performance.

Electronic Administration (E-Admin) systems have emerged as transformative tools in institutional management. Leveraging web-based technologies, these systems automate routine administrative tasks, streamline workflows, and improve data accuracy [2]. Their adoption has demonstrated significant improvements in organizational coordination, real-time access to information, and transparency [3].

In line with these advancements, the development and implementation of an E-Admin system for the Registry Unit at Federal Polytechnic Ile Oluji aims to modernize its operations and mitigate existing bottlenecks.

The Registry Unit at Federal Polytechnic Ile Oluji comprises three critical sub-units: Personnel, Academic, and Council Affairs. Each sub-unit manages distinct administrative responsibilities integral to the institution's operations. The Personnel Unit oversees staff information, appointments, and records; the Academic Unit handles student registration, enrollment, and academic records; and the Council Affairs Unit manages council member activities and documentation. The manual handling of these processes often leads to data inaccuracies, delayed communication, and reduced operational efficiency [4].

In recent years, web-based E-Admin systems have proven effective in addressing such challenges. These systems provide user-friendly interfaces and integrated modules tailored to specific administrative requirements, thereby enhancing productivity and operational efficiency. Studies indicate that implementing E-Admin systems in educational institutions can reduce administrative workloads by 40–60% while significantly improving data management accuracy [5]. Consequently, developing an E-Admin system for the Registry Unit represents a strategic initiative to modernize administrative functions and align with global best practices.

This study focuses on designing and implementing a robust E-Admin system tailored to the unique needs of the Registry Unit at Federal Polytechnic Ile Oluji. By digitizing core administrative functions, the system is expected to enhance data management, facilitate communication among sub-units, and boost institutional productivity. The system's architecture leverages web technologies to ensure scalability, accessibility, and seamless integration with existing institutional frameworks. Subsequent sections of this paper detail the system's design methodology, implementation, and evaluation.

By presenting a case study of the Registry Unit at Federal Polytechnic Ile Oluji, this research aims to contribute to the growing body of knowledge on E-Admin systems in educational contexts. Ultimately, this work underscores the critical role of automation in enhancing administrative efficiency and fostering institutional growth.

II. REVIEW OF LITERATURE

The development and implementation of Electronic Administration (E-Admin) systems have been extensively studied as a means to streamline administrative processes in educational institutions. These systems are designed to automate routine tasks, enhance data management, and improve communication across various administrative units. This section reviews related literature and case studies on E-Admin systems, focusing on their design, implementation, and impact in educational settings.

Over the years, E-Admin systems have gained prominence due to their ability to address inefficiencies in traditional administrative processes. As highlighted by N. S. A. Karim *et al.,* [6], E-Admin systems possess transformative potential, particularly in automating time-intensive tasks such as record keeping. Key benefits identified include reduced human error, faster processing times, and improved accessibility to institutional data.

In a related study, K. A. Idris [7] examines the role of Electronic Land Administration Systems (eLAS) as an enabler of sustainable land administration. Acknowledging the critical contribution of land administration to sustainable development, the study consolidates existing research to evaluate the impacts, challenges, successes, and shortcomings of eLAS implementation. The review explores how eLAS can enhance land administration processes and improve efficiency in achieving sustainability goals. By critically analyzing the literature, the study offers valuable insights into opportunities and obstacles surrounding eLAS adoption, providing guidance for policymakers, practitioners, and researchers committed to advancing sustainable land administration through effective eLAS practices.

N. S. Abdul Karim *et al.,* [8] presents a focused research report on risk management and security challenges associated with fraud threats in the Malaysian Electronic Land Administration System. The study analyzes potential threats using evidence from past studies, working papers, official documentation, and field observations. Its findings classify and detail the prevalence of fraud while offering insights into its impact. Additionally, the paper proposes strategies to mitigate these threats, emphasizing the effective application of technology, sound policies, and strategic measures to enhance security and reduce fraud risks within the system.

In the healthcare domain, D. Rwegasira *et al.,* [9] discusses the development of an effective electronic medical record system designed to capture, manage, and intelligently process patient data across all healthcare services. The study

introduces iCareConnect+, an OpenMRS-based electronic medical record system implemented at the University of Dares Salaam Health Centre's living lab. This system was developed through collaborative efforts among stakeholders, including doctors, cashiers, laboratory technicians, pharmacists, and IT experts. Contributions included knowledge sharing, challenge identification, system design and testing, feedback provision, training, and research. The research highlights key challenges encountered during development, methodologies adopted, outcomes achieved, and benefits realized. Furthermore, it offers strategies and recommendations for ensuring the sustainable development and optimization of hospital management information systems, emphasizing the role of the living lab model in fostering innovation and enhancing system performance.

Improving the adoption of electronic medical records (EMRs) requires continuous effort. While prior research often overlooks the role of social interaction in shaping user behavior, Y. H. Lai [10] recognizes that individual actions are significantly influenced by social contexts. Social influence, in particular, plays a crucial role in shaping users' intentions to adopt EMR systems. Grounded in the behavioral conformity perspective, this study investigates the factors driving the intention to use EMRs, extending the traditional contagion model. The findings reveal that social influence significantly impacts users' behavioral intentions, providing a robust explanation for EMR adoption. Overall, the extended model offers a comprehensive framework for understanding and enhancing the use of EMR systems.

L. Umek *et al.,* [11] presents a survey conducted at a member institution of the University of Ljubljana offering public administration programs. The survey analyzed the relationship between the introduction of blended learning, supported by the Moodle Learning Management System (LMS), and students' academic performance. This study further examined the relationship across different student groups, categorized by selected socio-demographic factors, using data collected between 2008 and 2014. The findings indicate a significant improvement in students' performance following the adoption of blended learning. Additionally, for the final academic year analyzed, the study evaluated the proportion of course content delivered through Moodle and its impact on students' performance and satisfaction. The results revealed a positive correlation, suggesting that higher Moodle integration was associated with better academic outcomes and increased student satisfaction.

Digitalization, the adoption of digital technologies, has become a defining feature of the modern era. India, following the United States and China, ranks as the third-largest consumer of internet services. Digital technology serves as a transformative force in education, akin to a ship navigating the vast ocean of modern learning. [12] explores how digital technology is reshaping education, making it more globalized and accessible in the 21st century. Employing a conceptual and analytical approach, the study relies on secondary data sourced from books, national and international journals,

government publications, and reputable websites. The analysis highlights digitalization as a significant trend in Indian education, driving its evolution to meet global standards.

E-learning has become a key component of the evolving educational systems of the 21st century, characterized by continuous change. With the growing number of internet-savvy users, e-learning is gaining widespread popularity. The availability of faster internet bandwidth has significantly contributed to increased e-learning adoption among students. Colleges and universities are increasingly integrating e-learning into their curricula to enhance skills, knowledge, and collaboration between educational institutions and industries. Interactive classrooms equipped with live and video conferencing are also being implemented for specialized topics. M. K. Ganeshan *et al.,* [13] utilized secondary data from various sources, including literature reviews, e-libraries, and published and unpublished reports. India plays a pioneering role in e-learning with initiatives like the e-Gyankosh project, a National Digital Repository of Learning Resources launched by Indira Gandhi National Open University (IGNOU) in 2006. IGNOU also introduced GyanDarshan, a 24-hour e-learning satellite channel, solidifying India's leadership in the field. The study examines the evolution of e-learning and its role in reshaping education in the years ahead.

The Engineering Faculty at Jakarta State University (UNJ) comprises 20 departments, with student enrollment increasing annually. Currently, the administration system relies on multiple platforms, including email, Google Forms, messenger apps, and predominantly manual processes. This approach presents challenges, such as difficulties in efficiently and accurately collecting data. The situation became more complex during the pandemic as traditional administrative processes were disrupted. To address these issues, I. P. Sari *et al.,* [14] developed a web-based student administration system with an integrated database. This system marks the initial step toward implementing data-driven decision-making in student affairs. The prototype methodology was employed during development, using the CodeIgniter framework and MySQL for database management. The system offers features such as access to achievement reports, scholarship information, and administrative services.

Existing educational administration management systems primarily focus on functions such as school registration, education planning, course management, and score management, often overlooking attendance management. Z. Zhang *et al.,* [15] investigated and designed an educational administration attendance management system to address this gap, specifically catering to the attendance needs of colleges. The system was developed using VisualStudio.NET 2003 and Oracle9i, adopting a hybrid B/S (Browser/Server) and C/S (Client/Server) architecture. A layered design approach was employed to structure the system effectively. To evaluate its functionality, the system's real-time class query feature was tested, demonstrating that it meets college attendance management requirements.

The existing literature emphasizes that E-Admin systems in educational institutions enhance data management, improve efficiency, and reduce administrative burdens across various departments. However, limited work has focused specifically on integrated registry unit systems that address the unique needs of personnel, academic, and council data within a single platform. The proposed E-Admin system for Federal Polytechnic Ile Oluji aims to fill this gap, leveraging insights from existing studies on segmented data access, personnel and student information systems, council data digitization, and role-based access controls to ensure secure, efficient, and streamlined administration across the registry's core units.

III. METHODOLOGY

The design and implementation of the E-Admin system followed an iterative development model, specifically the Agile methodology. This approach allowed for continuous feedback, enabling iterative adjustments to meet the distinct needs of the Personnel, Academic, and Council units. Each development cycle included planning, design, implementation, and testing phases, with incremental improvements based on user feedback.

A. System Requirements Analysis

The initial requirements-gathering phase involved consulting key stakeholders within the Registry Unit, including department heads and officers responsible for personnel, academic, and council records. These consultations identified the functional requirements for each unit.

1. *Personnel Department:* Required functionalities include staff record management, role and duty assignment, and access to employee performance histories.
2. *Academic Department:* Required functionalities include student record management, grade reporting, enrollment data, and academic progress tracking.
3. *Council Department:* Required functionalities include council member information management, decision records, and secure data sharing among council members.

Based on these requirements, a comprehensive system requirements document was developed to guide the design and functionality of the E-Admin system.

B. System Architecture

The E-Admin system was designed as a multi-tier architecture to ensure scalability, data security, and ease of maintenance. The system architecture comprises the following layers.

1. *Presentation Layer:* The front end of the system consists of a user-friendly web interface that allows officers from

the Personnel, Academic, and Council units to interact with the system. The interface was developed to ensure ease of navigation, with each module's functionalities segmented based on user roles.

2. *Application Layer:* This layer contains the business logic of the system, handling all processing tasks related to data input, updates, and retrieval. The application layer processes user requests and ensures data integrity by applying the necessary business rules for each department.

3. *Data Layer:* This layer comprises the database that stores all records and ensures secure data storage and retrieval. The database structure includes tables for storing information about staff, students, and council members, each with distinct access protocols.

C. Development Tools and Technologies

The development of the E-Admin system utilized several tools and programming languages to achieve its objectives.

1. *Front-End Development:* HTML, CSS, and JavaScript were used to create an interactive and responsive user interface. Bootstrap was employed to enhance the system's mobile compatibility, ensuring accessibility across different devices.

2. *Back-End Development:* PHP and Python were chosen for server-side programming to handle data processing and business logic. PHP was used to manage form submissions and database interactions, while Python scripts were implemented for more complex data processing tasks.

3. *Database Management System (DBMS):* MySQL was selected for the database due to its reliability, scalability, and compatibility with PHP. Database tables were structured to accommodate data from all three departments (Personnel, Academic, and Council) while adhering to data normalization standards to prevent redundancy.

4. *Version Control and Project Management:* Git was utilized for version control to track code changes and enable collaboration among team members. Agile project management tools, such as Trello, were used to monitor progress and ensure timely completion of each development sprint.

D. Role-Based Access Control (RBAC) Implementation

To maintain data security and ensure the privacy of each unit, the system employs Role-Based Access Control (RBAC). Each module (Admin, Personnel Officer, Academic Officer, Council Officer) is assigned specific access permissions based on user roles.

1. *Admin Module:* Provides the system administrator with full access to all system functionalities, including user management and data backups.

2. *Personnel Officer Module:* Grants access to staff data, enabling personnel officers to manage records related to staff recruitment, performance reviews, and employment history.

3. *Academic Officer Module:* Allows academic officers to manage student data, including admissions, grades, and academic progress records.

4. *Council Officer Module:* Enables council officers to access council records, review decisions, and manage council member information securely.

RBAC implementation ensures that only authorized users can access specific data, enhancing system security and data privacy.

A rigorous testing phase was conducted to ensure system reliability, usability, and security. The testing process included the following stages.

1. *Unit Testing:* Each module was tested individually to validate its functionality and ensure it performs as expected. Specific test cases were designed for each module to cover various input scenarios.

2. *Integration Testing:* Once individual modules were validated; integration testing was performed to verify seamless interaction among components. This ensured smooth data flow across the modules, maintaining consistency and preventing errors.

3. *User Acceptance Testing (UAT):* After completing unit and integration testing, the system was deployed in a test environment. Representatives from the Personnel, Academic, and Council departments interacted with the system, and their feedback was used to make final adjustments to the interface and functionality.

4. *Security Testing:* Tests focused on user authentication, data encryption, and the prevention of unauthorized access to ensure data security and robust access controls.

The E-Admin system was deployed on a secure server within the institution's network, ensuring internal data access while restricting external interference. A maintenance plan was established post-deployment to provide periodic system updates, security patches, and user training sessions. Regular data backups were scheduled to prevent data loss and facilitate quick recovery in case of system failure.

IV. SYSTEM ARCHITECTURE OF THE E-ADMIN SYSTEM

The system architecture diagram for the E-Admin system illustrates the main modules and their relationships within the Federal Polytechnic Ile-Oluji's registry system. Below is an explanation of each component and its interactions:

1. *User Interface (UI):* The front end of the system where users (e.g., registry officers from the Personnel, Academic, and Council departments) interact with the E-Admin system. It provides a structured and accessible interface for managing tasks such as leave applications, memos, and staff profiles.

2. *Authentication & Authorization:* Ensures secure access to the system. Users authenticate (e.g., via username and password) and are authorized based on roles (e.g., Personnel Officer, Academic Officer, Council Officer). This module restricts access to sensitive data based on user permissions.
3. *Leave Management:* Manages staff leave requests, approvals, and histories. Users can submit leave requests, while administrators track and approve them.
4. *Memo Management:* Handles internal communications and memos within the registry unit. Authorized users can create, view, and distribute memos.
5. *Staff Profiles:* Stores and manages detailed information about staff, including personal data, job roles, and employment history. This module is integrated with performance appraisal and training tracking.
6. *Promotion Archives:* Keeps records of staff promotions, documenting dates, previous positions, and new roles. It serves as an archive for promotion history and supports performance reviews.

7. *Documentation Management:* Organizes and manages registry-related documents, enabling categorization, storage, and retrieval of essential paperwork.
8. *Task Management:* Helps users organize and track tasks related to registry operations, including setting priorities, assigning responsibilities, and monitoring task completion.
9. *Meeting Scheduling:* Facilitates scheduling meetings, sending notifications, and tracking agendas and outcomes.
10. *Performance Appraisal:* Records and manages staff performance evaluations over time, linking ratings and feedback to staff profiles for use during promotion reviews.
11. *Training & Development Tracking:* Tracks staff training and professional development activities, including courses, certifications, and workshops.
12. *Database:* The system's backbone, providing centralized and secure storage for all data. It supports data retrieval for different modules and ensures data integrity and consistency across the system.
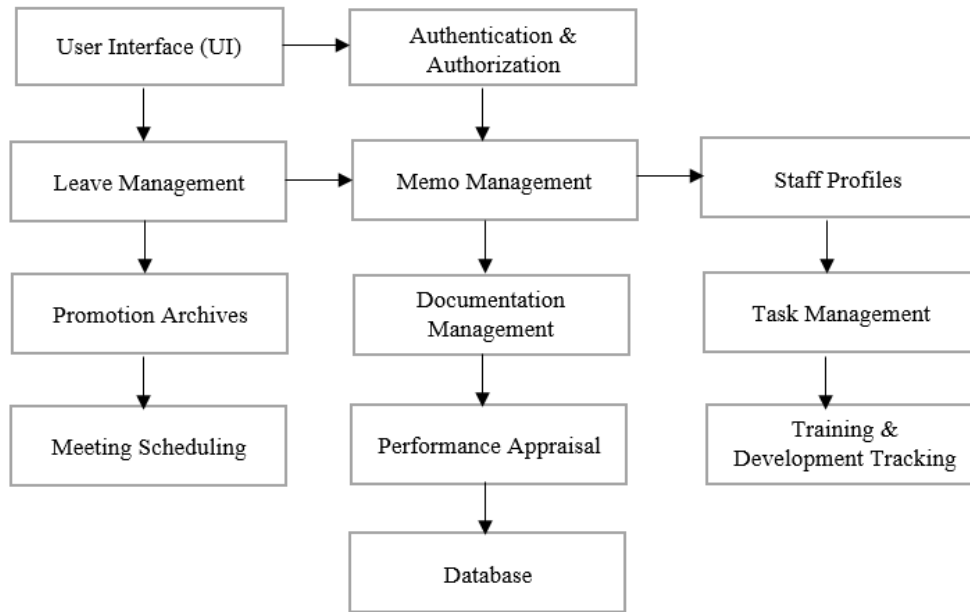

Fig. 1 System Architecture of the System

A. The Flowchart of the E-Admin System

The flowchart of the E-Admin system, shown in Fig. 2, provides a step-by-step visual representation of the main functions and processes involved in the system's workflow.

1. *Start:* The flow begins with the initiation of the system, prompting users to interact with the E-Admin platform.
2. *User Login:* Users (staff from the registry unit) log into the system by providing their credentials. This step ensures secure access for authorized personnel only.
3. *Authentication & Authorization:* Upon login, the system authenticates the user's credentials and determines their role-based permissions. This step

restricts access to authorized sections of the system for different types of users (Personnel, Academic, or Council officers).
4. *Dashboard:* After authentication, users are directed to the main dashboard, which serves as a central hub for accessing various system functionalities based on their roles.
5. *Core Functional Modules:* The dashboard provides access to three primary modules, each serving specific administrative functions within the registry:
   a. *Leave Request:* Manages employee leave applications and approvals.
   b. *Promotion Archives:* Maintains records of past and current staff promotions.

c. *Meeting Scheduling:* Facilitates the scheduling and organization of meetings with council members and other administrative staff.

6. *Middle Modules:* These modules handle essential administrative and operational tasks:

   a. *Memo Management:* Manages the creation, distribution, and storage of internal memos.

   b. *Documentation Management:* Organizes and maintains official documentation for easy retrieval and record-keeping.

   c. *Performance Appraisal:* Supports the appraisal and review of employee performance, enabling the recording and tracking of feedback and ratings.

7. *Additional Modules:* These modules enhance the system's administrative efficiency:

   a. *Profile Management:* Updates and maintains detailed staff profiles, including job roles and employment history.

   b. *Task Management:* Allows users to assign and track tasks related to registry operations.

   c. *Training & Development Tracking:* Records training sessions, workshops, and professional development activities attended by staff.

8. *Database Update:* After using any module, relevant data is updated in the centralized database. This ensures consistent recording of all actions and information.

9. *End:* The workflow concludes with an end state, marking the completion of user actions within the session.

10. *Data Flow and Interactions:* Arrows in the flowchart illustrate the flow between modules, showing how users progress based on their tasks. Following authentication, users can directly access the modules relevant to their department, with all actions leading to updates in the centralized database to maintain data consistency and reliability.
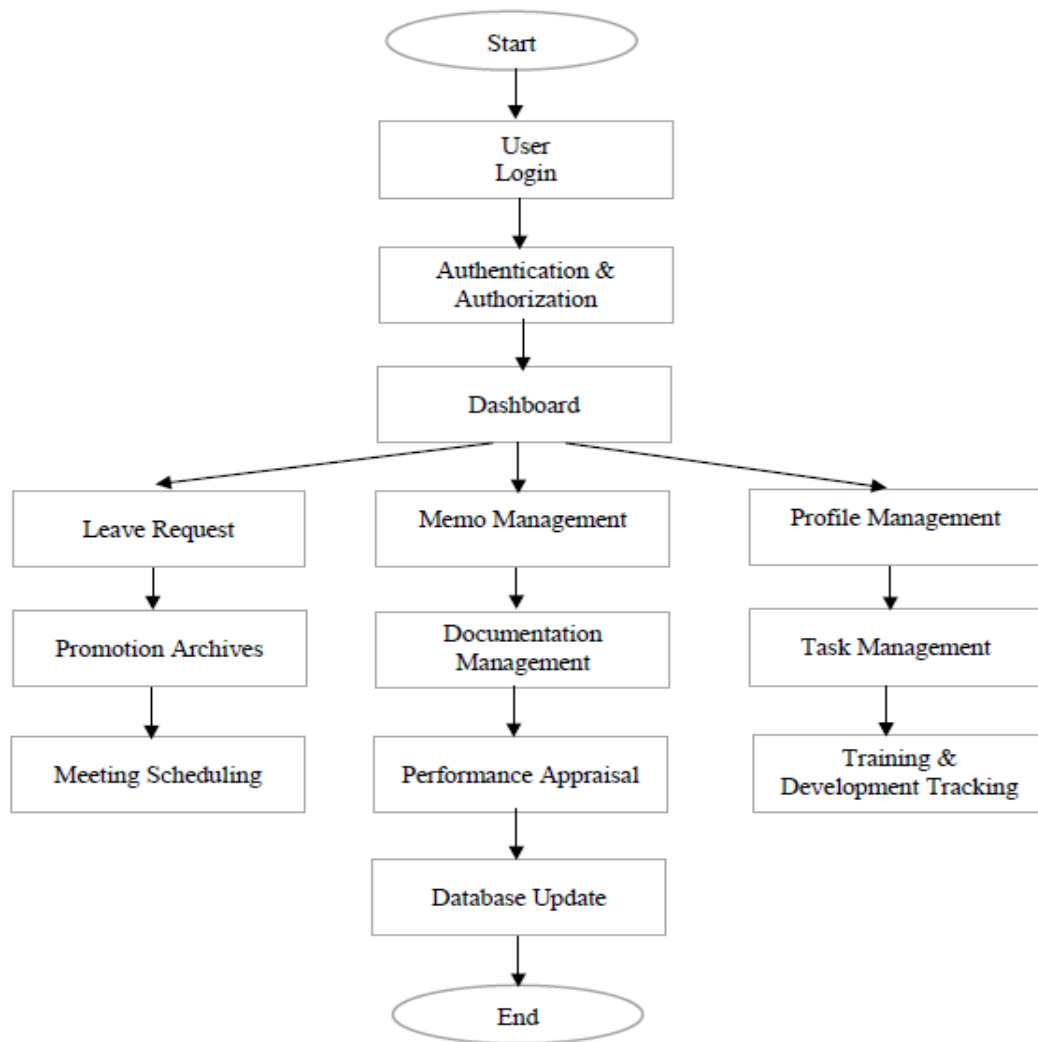

Fig. 2 Flowchart of the System

This flowchart provides a structured pathway for each administrative process, streamlining the operations of the registry unit by ensuring that users have organized access to the necessary tools and functions.

B. Dashboard

The dashboard is the central platform of the E-Admin system for managing staff and other administrative data. Its key components are as follows.

1. *Dashboard Overview:* The main dashboard provides an at-a-glance summary of key metrics. It displays counts across various categories, allowing the administrator to quickly assess the status of entities within the system.
2. *Total Staff:* Displays the total number of staff members recorded in the system (e.g., 20).
3. *Total Upload:* Represents the total number of documents or files uploaded into the system (e.g., 12).
4. *Total Academic Affairs Officer:* Indicates the count of staff assigned to the Academic Affairs department (e.g., 39).
5. *Total Council Affairs Officer:* Displays the total number of officers in the Council Affairs department (e.g., 8).
6. *Left Sidebar:* Contains the main navigation menu with sections such as *Dashboard*, *Management*, *Tables*, *Profile*, and *Timeline*. It also includes an *Authentication* section, which likely encompasses login and security settings.
7. *Top Bar:* Includes a search bar, notification icon, and settings icon, providing quick access to search functions, alerts, and system customization.
8. *Add:* A button that facilitates the addition of new records or entries to the system.
9. *Portfolio:* A section for staff or administrators to manage their personal information and achievements.
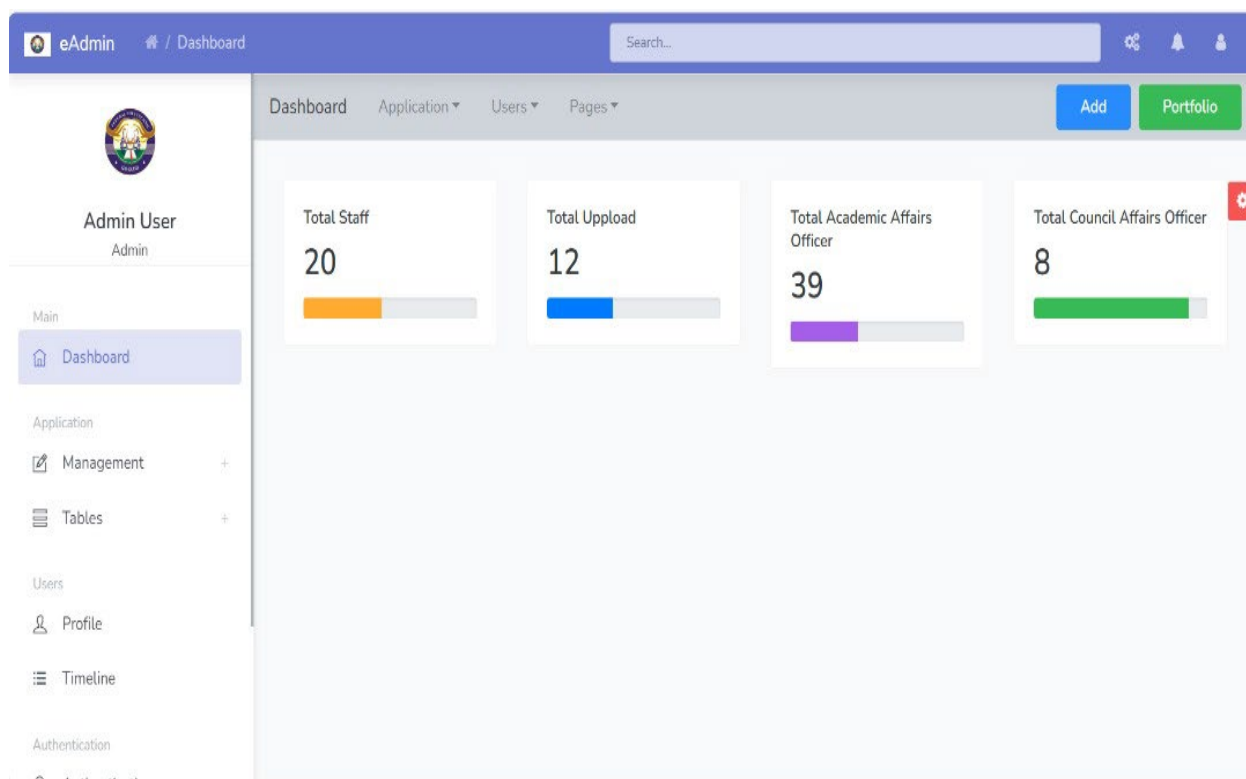

Fig. 3 Dashboard of the System

This dashboard is part of an administrative tool designed to efficiently manage staff information and departmental data, such as tracking staff members across different units and uploaded documents. The design is clean and straightforward, supporting easy navigation and quick data access.

C. Personnel Section

Figure 3 shows a portion of the E-Admin system interface, focusing on the Appointment and Performance Evaluation sections.

1. *Appointment Section:* Contains fields related to staff appointments or administrative records.

2. *Textarea:* A text area labeled "With Textarea" is provided for entering additional information or notes related to the appointment.

3. *Performance Evaluation Section:* This section is used to assess and document performance evaluations for staff. Input fields labeled "Small" and "Default" suggest different levels of evaluation criteria, possibly corresponding to various performance metrics or scores.
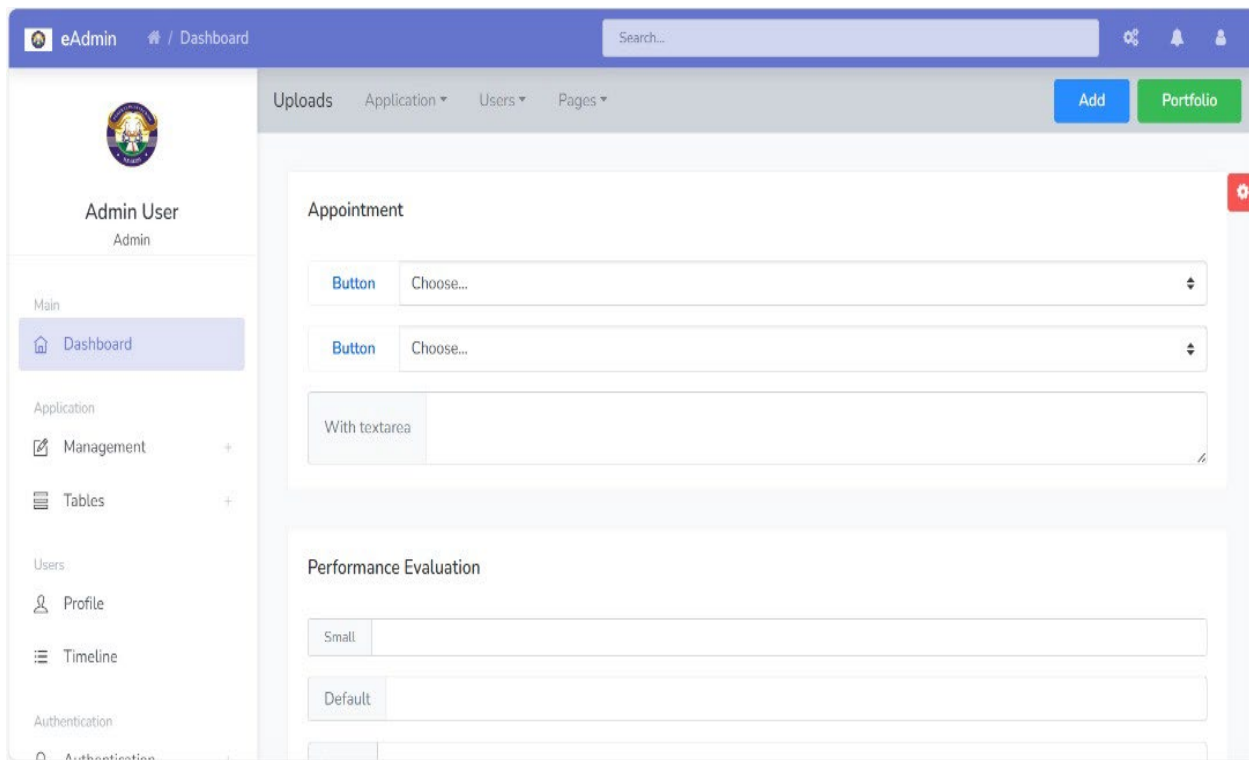
Fig. 4 Personnel Section

This interface allows the administrator to manage staff appointments and performance evaluations by filling in relevant data and selecting from dropdown options. The form layout is clean and organized, supporting easy data entry and record-keeping within the E-Admin system.

V. CONCLUSION

The design and implementation of the Electronic Administration (E-Admin) system for the Registry Unit of Federal Polytechnic Ile-Oluji mark a significant step toward modernizing and streamlining administrative processes within the institution. By centralizing key functions in the Personnel, Academic, and Council Affairs sub-units, this system effectively reduces the reliance on manual paperwork and enhances operational efficiency. The E-Admin system provides a robust platform for managing critical data related to staff and students, ensuring data accuracy, easy accessibility, and improved communication across sub-units. Through automation, the system simplifies appointment management, performance evaluations, student records processing, and council affairs administration, fostering a more organized and productive registry unit. Furthermore, it allows for seamless data integration, enhancing decision-making and enabling quick access to essential information by authorized personnel. The implementation of the E-Admin system also aligns with the institution's goal of digital transformation and supports its mission to deliver high-quality administrative services. In conclusion, the E-Admin system not only optimizes the registry's workflow but also sets a foundation for future improvements in data management and administrative efficiency. It creates an adaptable framework that can be further expanded to accommodate new functionalities, ensuring that the Federal Polytechnic Ile-Oluji remains responsive to emerging administrative needs and technological advancements. The successful deployment of this system will significantly benefit the institution's staff, students, and governing bodies, promoting a more cohesive and efficient administrative environment.

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