# AN INTERNSHIP OPPORTUNITIES INFORMATION SYSTEM FOR EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE MAKERERE UNIVERSITY

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## DECLARATION

We hereby declare that this project report is our original work as group 36 members and has not been submitted to any other institution for the award of any academic qualification. All sources of information used in this project report have been duly acknowledged and referenced.

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## APPROVAL

This project was done under the supervision of university supervisor,

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Signed ..... Date 23/7/2026

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## DEDICATION

This project report is dedicated to our dear parents for their moral and financial support while at Makerere University. It is also dedicated to our lecturers at Makerere University. May God above bless you abundantly for your selfless sacrifice and support.

## ACKNOWLEDGEMENT

We are deeply grateful to the almighty God for his guidance that enabled us to fulfil our dream of embarking and successfully completing a Bachelor's degree program study in Library and Information Science. It is with pleasure that we wish to acknowledge the enormous academic contributions of our lecturers not forgetting their support with relevant academic materials during my entire program study.

We acknowledge with thanks the role played by our project supervisor Mrs. Faridah Muzaki for her spectacular guidance and support throughout the entire project course. We also do wish to thank all the academic staff of EASLIS and the College of Computing and Information Science and Makerere University at large.

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## LIST OF ACRONYMS /ABBREVIATIONS

| Acronym | Meaning |
|---|---|
| **EASLIS** | East African School of Library and Information Science |
| **IOIS** | Internship Opportunities Information System |
| **DBMS** | Database Management System |
| **ICT** | Information and Communication Technology |
| **LIS** | Library and Information Science |
| **UI** | User Interface |
| **URL** | Uniform Resource Locator |
| **HTTP** | Hypertext Transfer Protocol |
| **HTML** | Hypertext Markup Language |
| **CSS** | Cascading Style Sheets |
| **PHP** | Hypertext Preprocessor |
| **SQL** | Structured Query Language |
| **MySQL** | My Structured Query Language |
| **CRUD** | Create, Read, Update and Delete |
| **UML** | Unified Modelling Language |
| **DFD** | Data Flow Diagram |
| **ERD** | Entity Relationship Diagram |
| **LAN** | Local Area Network |
| **WAN** | Wide Area Network |

## ABSTRACT

This project focused on the design and development of an Internship Opportunities Information System for EASLIS, Makerere University. The study was motivated by challenges associated with the existing internship opportunities management practices, which relied on notice boards, emails, social media platforms, informal communication channels, and manual record-keeping. These practices resulted in fragmented information dissemination, delayed access to internship opportunities, poor tracking of applications, increased administrative workload, and inefficient management of internship records. The study was guided by four objectives: to examine the existing internship opportunities management practices at EASLIS; to identify the requirements for developing an Internship Opportunities Information System; to develop the system; and to test and validate the developed system. A mixed-methods case study design was adopted. Data were collected using questionnaires, semi-structured interviews, observation, and document review from students, academic staff, internship coordinators, administrative staff, and ICT personnel. A target sample of 285 respondents was selected from a study population of 1,071, and a response rate of 94% was achieved. Existing internship management practices were largely manual and fragmented, leading to delayed dissemination of internship information, limited accessibility, fragmented communication, high administrative workload, poor monitoring of internship opportunities, and the absence of a centralized internship management platform. The study established the need for a centralized system capable of supporting user authentication, internship opportunity posting, internship search and filtering, online application submission, application tracking, employer profile management, notifications, communication, reporting, and secure record management. These findings informed the design and development of a web-based Internship Opportunities Information System implemented using PHP, MySQL, HTML5, CSS3, Bootstrap, JavaScript, and WAMP SERVER.System testing and validation confirmed that the developed system successfully improved access to internship opportunities, enhanced communication among stakeholders, simplified internship application management, strengthened record management, reduced administrative workload, and improved coordination of internship activities. The study concludes that the developed System provides an effective solution to the limitations of the existing internship management practices at EASLIS. The study recommends the deployment of the system within EASLIS, integration of automated email and SMS notifications, continuous updating of internship opportunities, regular user training, and periodic system maintenance to ensure sustainability, security, and improved service delivery

# CHAPTER ONE: INTRODUCTION

## 1.0 Introduction

This section introduces the problem that this study addressed while articulating the background of the study, problem statement, research objectives, scope, significance as well as definition of key terms of the study.

## 1.1 Background of the study

In Uganda, internship and field attachment programmes constitute an important component of university education (Makerere University, 2022). Makerere University requires students in many academic programmes to undertake field attachment as part of experiential learning and skills development. According to Makerere University's Field Attachment Programme guidelines, field attachment enables students to integrate academic knowledge with practical work experience while strengthening collaboration between the university and host organizations (Makerere University, 2022).

EASLIS prepares students for professional practice in librarianship, records and archives management, information management, knowledge management, and related information professions (Makerere University, 2022). Internship training forms a critical component of the academic programmes offered by the school because it exposes students to practical information work environments and facilitates the acquisition of professional competencies (Makerere University, 2022; Magara, 2011). However, the increasing number of students seeking internship opportunities, coupled with the need to coordinate communication among students, administrators, supervisors, and host organizations, requires efficient information management mechanisms.

The integration of information systems into higher education administration has transformed the management of academic and student-support processes across the world (Al-Busaidi & Al-Shihi, 2012). Universities increasingly rely on digital information systems to manage student records, learning activities, assessment processes, and experiential learning programs (OECD, 2021). Information systems improve organizational efficiency by facilitating the collection, storage, retrieval, processing, and dissemination of information required for decision-making and service delivery (Laudon & Laudon, 2022). In higher education institutions, such systems have become essential in supporting administrative effectiveness, transparency, accountability, and timely access to information (OECD, 2021; UNESCO, 2023).

Globally, internship programs have become an integral component of higher education because they provide students with opportunities to apply theoretical knowledge in real work environments while developing professional competencies required by employers (Mseleku, 2024). Research has shown that internships enhance students' employability, workplace readiness, professional networking, and career development (Narayanan et al., 2010). Through internships, students gain practical experience, develop problem-solving abilities, and acquire industry-relevant skills that complement classroom learning (Mseleku, 2024; Garwe, 2020). As internship participation continues to increase, universities and training institutions are increasingly adopting digital platforms to coordinate placement processes, monitor student progress, facilitate communication among stakeholders, and manage internship records efficiently (Pratama et al., 2022; Vidya Kusala et al., 2023).

The growing use of internship information systems has been driven by the need to address challenges associated with manual administration of internship programs (Sihombing & Fitriani, 2023; Pratama et al., 2022). Web-based internship management systems improve the management of internship applications, placement allocation, supervision, report submission, assessment, and information dissemination while reducing administrative delays and data management errors (Hasti et al., 2019). Sihombing and Fitriani (2023) found that web-based internship administrative information systems improve the efficiency of internship administration. Likewise, Pratama et al. (2022) demonstrated that internship management information systems enhance coordination and monitoring of internship activities, while Vidya Kusala et al. (2023) reported that internship information systems improve record management, supervision, and reporting processes. Similarly, integrated internship management systems enhance transparency, accountability, and efficiency by automating registration, attendance monitoring, evaluation, and reporting processes (Karyn et al., 2025). These developments demonstrate the increasing importance of digital solutions in supporting experiential learning programs and internship administration.

In Africa, universities are increasingly emphasizing work-integrated learning as a mechanism for enhancing graduate employability and aligning higher education outcomes with labour market demands (African Development Bank, 2024; Mageza-Mokhethi & Adekanmbi, 2024). However, many institutions continue to experience challenges in managing internship activities due to fragmented processes, inadequate information management practices, and limited use of digital technologies (UNESCO, 2023). The African Development Bank (2024) notes that strengthening digital transformation within higher education institutions is essential for

improving graduate preparedness and supporting the development of a skilled workforce capable of meeting emerging labour market requirements. Consequently, universities are increasingly investing in digital systems that support academic administration and student engagement activities, including internships and industrial training (OECD, 2021)

Therefore, this study sought the development of an Internship Opportunities Information System for EASLIS, to improve the management and accessibility of internship-related information and services.

### 1.1.1 Background of Organization

The East African School of Librarianship was established in 1963 with initial support from American and British Agencies, then known as the East African School of Librarianship (EASL). It started training students the East, Central and Southern Africa by offering a Certificate in Librarianship. Later, the Diploma in Library and Information Studies was introduced. In 1989, the school introduced the Bachelor of Library and Information Science (BLIS) programme, and this was a springboard for professional Library and Information Science training and research.

The integration of information science in the curriculum led to the change of the school's name to the East African School of Library and Information Science, as is called today. The School stood as an independent academic unit equivalent to a faculty until 2011, when it merged with the School of Computer Science to form the current College of Computing and Information Sciences.

The school evolved from one certificate programme to offering seven programmes, including

1) Certificate in Library and Information Studies – since inception
2) Diploma in Library and Information Studies
3) Diploma in Records and Archives Management
4) Bachelor of Library and Information Science – since 1989
5) Master of Science in Information Science – since 1997
6) Master of Science in Records and Archives Management – Since 2016
7) Doctor of Philosophy in Information Science – Since 2004

## 1.2 Statement of the Problem

Internship training is a mandatory and essential component of academic programmes at the EASLIS, Makerere University because it enables students to acquire practical experience and

professional competencies required in the information and knowledge management sector (Makerere University, 2022). Effective internship administration depends on the timely identification of internship opportunities, efficient dissemination of information, proper coordination of student placements, continuous supervision, and systematic management of internship records. However, these processes require accurate, accessible, and well-coordinated information management mechanisms (Hasti et al., 2019; Karyn et al., 2025).

Currently, internship-related information is often distributed through fragmented channels such as notice boards, email communication, social media platforms, personal networks, and departmental announcements. Information regarding available internship opportunities, host organizations, application deadlines, placement requirements, student applications, supervisor allocations, and internship reports is not managed through a centralized system. As a result, students experience difficulties in identifying relevant internship opportunities, accessing timely information, tracking application progress, and obtaining feedback regarding placements.

The absence of an integrated internship information system has created several administrative and operational challenges. Because internship records and communications are dispersed across multiple platforms and manual processes, administrators face difficulties in maintaining accurate records, monitoring student placement status, tracking internship applications, and generating timely reports. This situation increases the likelihood of information loss, duplication of records, delayed communication, inconsistencies in internship documentation, and inefficient coordination among students, supervisors, and host organizations. Similar challenges have been reported in institutions that rely on manual internship administration processes, where inadequate integration of internship information leads to delays, reduced transparency, and administrative inefficiencies.

Consequently, students miss internship opportunities, experience delays in placement, encounter difficulties accessing internship-related information, and face challenges in fulfilling internship requirements. Administrators and academic supervisors also expend significant time and effort managing internship activities manually, which limits operational efficiency and reduces the effectiveness of monitoring and evaluation processes.

Therefore, there is a critical need for an Internship Opportunities Information System to centralize internship information and administration of internship activities at the EASLIS.

### 1.3 Overall Objective

The overall objective of this project was development of an Internship Opportunities Information System for EASLIS, Makerere University.

### 1.4 Specific Objectives

The study was guided by the following specific objectives:

1) To identify the existing internship opportunities management practices at EASLIS.
2) To find out the challenges of the current internship opportunities management practices at EASLIS.
3) To find out the solutions to the challenges of the current internship opportunities management practices at EASLIS.
4) To establish the requirements necessary for an internship opportunities information System for EASLIS.
5) To develop a web-based Internship Opportunities Information System for EASLIS

### 1.5 Research Questions

The study sought answers to the following research questions:

*Theme: Existing Internship Opportunities Management Practices*

What internship opportunities management practices are currently used at EASLIS?

How are internship opportunities identified, communicated, and managed at EASLIS?

*Theme: Challenges in Internship Opportunities Management*

What challenges are associated with the current internship opportunities management practices at EASLIS?

*Theme: Solutions and Improvement Strategies*

What solutions can be adopted to address the challenges of the current internship opportunities management practices at EASLIS?

What are the perceptions of students and staff regarding possible solutions to improve internship opportunities management at EASLIS?

*Theme: System Requirements*

What functional requirements are necessary for the development of an Internship Opportunities Information System for EASLIS?

What non-functional requirements are necessary for the development of an Internship Opportunities Information System for EASLIS?

*Theme: System Design and Development*

How can a web-based Internship Opportunities Information System be developed to support internship opportunities management at EASLIS?

What architectural design is most suitable for the proposed Internship Opportunities Information System?

## 1.6 Scope of the Study

### 1.6.1 Contextual scope of the study

The study focused specifically on the development and evaluation of an internship opportunities information system for EASLIS, Makerere University.

The study focused on the existing internship opportunities management practices, challenges of the current internship opportunities management practices, solutions to the challenges of the current internship opportunities management practices and development of a web-based Internship Opportunities Information System for EASLIS.

### 1.6.2 Geographical Scope

The study was conducted primarily at EASLIS, Makerere University, Kampala, Uganda.

### 1.6.3 Time Scope

The study was conducted within a period of four months from the month of March to June,2026.

## 1.7. Significance of the Study

The study benefits students at the EASLIS by providing a centralized platform through which they can access internship opportunities, application requirements, placement information, and internship-related announcements in a timely and convenient manner. Improved accessibility to internship information enhanced students' ability to identify relevant placement opportunities and participate effectively in internship programmes.

The study benefits internship coordinators and administrators by improving the management of internship records, student applications, placement information, and supervisory activities. The developed system reduced dependence on manual processes, improve record accuracy, facilitate report generation, and enhance overall administrative efficiency.

Academic supervisors benefit from improved monitoring and evaluation of internship activities. The system provides organized access to student placement information, internship reports, progress updates, and communication tools that support effective supervision and assessment of students undertaking internships.

The study contributes to the field of Library and Information Science by demonstrating the application of information systems in supporting internship management and experiential learning. The findings serve as a reference for future researchers and institutions seeking to develop digital solutions for internship administration and student placement management.

Finally, the project contributes to the broader digital transformation agenda within higher education by illustrating how information systems can improve service delivery, information accessibility, operational efficiency, and stakeholder engagement in internship and work-integrated learning programmes.

### 1.8 Definition of Key Terms

Internship Opportunity

An internship opportunity refers to a temporary structured work-based learning placement offered by an organization to students for the purpose of gaining practical experience, professional skills, and exposure to real work environments related to their field of study (Narayanan, Olk, & Fukami, 2010). Internship opportunities enable students to apply theoretical knowledge acquired in academic settings to workplace practice while enhancing employability and career readiness (Douglas & Adam, 2017).

Information System

An information system is an integrated set of people, technologies, processes, and data resources that collects, stores, processes, and disseminates information to support organizational operations, management, and decision-making (Laudon & Laudon, 2022).

# CHAPTER TWO: LITERATURE REVIEW

## 2.0 Introduction

This chapter presents a critical review of scholarly literature and industry reports related to web-based information systems, internship management systems, placement tracking platforms, and usability testing frameworks. The sources to be reviewed spanned the period from 2012 to 2026 and were drawn from reputable academic databases such as Google Scholar, Scopus, IEEE Xplore, ACM Digital Library, and ScienceDirect, which ensured coverage of both foundational theories in information systems and the latest developments in digital internship and work-integrated learning solutions.

Peer-reviewed journal articles, authoritative technical reports, and relevant case studies were selected based on their credibility, relevance, and applicability to internship coordination and placement processes within higher education institutions. Particular emphasis was placed on studies addressing operational efficiency, student internship tracking, supervisor coordination, and the challenges associated with managing internship opportunities in model academic environments specifically EASLIS, Makerere University.

## 2.1 Internship Opportunities Management in Higher Education Institutions

Internship programmes have become an integral component of higher education because they provide opportunities for students to acquire practical experience, develop professional competencies, and facilitate transition from academic environments to the workplace (Stewart et.al, 2021). internships enhance employability by enabling students to develop workplace skills and gain exposure to real-world professional environments. Universities therefore play an important role in coordinating internship opportunities, establishing partnerships with employers, communicating available placements, and monitoring student participation (ILO, 2021).

Traditionally, internship opportunities in many universities have been managed through departmental notice boards, institutional websites, email communications, internship coordinators, and employer networks (Hamidi, Azizi, Shuhidan, Aziz, & Mokhsin, 2017). However, studies indicate that these approaches often result in fragmented information dissemination and inefficient record management. Safitri and Supriyadi (2015) observed that manual internship administration processes create delays in information sharing and increase the likelihood of data loss. Similarly, Arifin (2014) reported that paper-based internship

management practices limit accessibility to internship information and complicate monitoring activities.

Research by Hamidi et al. (2017) found that increasing student enrolment places significant pressure on internship coordinators responsible for managing placements through manual methods. Likewise, Rahmi and Imilda (2023) observed that organizations managing internship programmes face difficulties maintaining accurate records and generating timely reports when relying on manual systems.

Pratama et al. (2017) further demonstrated that centralized digital internship management systems improve coordination among students, supervisors, and host organizations by providing a common platform for information sharing. Similarly, Apriani et al. (2022) found that web-based internship management platforms improve accessibility and facilitate real-time communication among stakeholders involved in internship programmes.

### 2.1.1 Internship Information Systems in Higher Education

Information systems have increasingly become essential tools for managing internship programmes within higher education institutions (Wallace, 2021). According to Pearson Higher Education, information systems integrate people, technology, data, and organizational processes to support operations and decision-making.

Internship information systems are specialized systems designed to facilitate internship opportunity dissemination, application management, placement tracking, supervision, and reporting (Subari et.al, 2021). Studies have shown that such systems significantly improve efficiency and information accessibility. Hamidi et al. (2017) found that internship management systems reduce data processing time and improve record accuracy. Similarly, Apriani et al. (2022) reported that web-based internship systems improve stakeholder communication and enable real-time access to internship information.

Research conducted by Rahmi and Imilda (2023) demonstrated that internship information systems improve information management efficiency and provide faster access to internship-related data. Similarly, Subari et al. (2018) found that web-based internship administration systems improve document management, application processing, and report generation. Zulfallah and Hidayatuloh (2021) further reported that internship information systems enhance transparency and monitoring of internship activities through centralized databases and automated workflows.

## 2.2 Challenges of Manual Internship Opportunities Management Practices

### 2.2.1 Fragmented Information Dissemination

The lack of centralized platforms for disseminating internship opportunities remains a major challenge in many higher education institutions. Information is frequently distributed through multiple channels such as emails, social media platforms, departmental offices, and notice boards. According to Arifin (2014), fragmented communication channels create information asymmetry among students and reduce awareness of available internship opportunities. Similar findings were reported by Rahmi and Imilda (2023), who found that decentralized communication mechanisms make it difficult for users to access complete and timely internship information.

### 2.2.2 Manual Record Management

Manual record management is associated with inefficiency, duplication, and poor information retrieval. Safitri and Supriyadi (2015) observed that paper-based internship administration systems increase the risk of document loss and data inconsistencies. Likewise, Hamidi et al. (2017) reported that manual record keeping negatively affects administrative efficiency and reduces the accuracy of internship records.

### 2.2.3 Limited Monitoring and Tracking

Monitoring internship applications, placements, and student progress remains difficult in institutions lacking dedicated information systems. Pratama et al. (2017) found that manual tracking methods hinder effective supervision and reporting. Similarly, Subari et al. (2018) reported that institutions using manual systems experience difficulties monitoring internship status and generating progress reports.

### 2.2.4 Delayed Communication

Timely communication between students, internship coordinators, and employers is critical for successful internship management. However, manual communication methods often cause delays. Apriani et al. (2022) found that the absence of centralized digital communication platforms contributes to slow dissemination of internship information and delayed stakeholder responses.

### 2.2.5 Increased Administrative Workload

Manual internship management places a significant burden on administrative staff. Rahmi and Imilda (2023) reported that increasing internship numbers create substantial workload pressures related to record keeping, information dissemination, and reporting. Similar findings were reported by Hamidi et al. (2017), who observed that manual internship administration consumes considerable staff time and resources.

## 2.3 Solutions to the Challenges of the Current Internship Opportunities Management Practices

### 2.3.1 Adoption of a Centralized Internship Opportunities Information System

A centralized internship opportunities information system integrates students, internship coordinators, academic supervisors, and host organizations into a unified digital environment where internship opportunities, applications, placements, supervision, and reports are managed electronically. Such systems eliminate duplication of records, reduce paperwork, and provide real-time access to internship information for authorized stakeholders. By maintaining a single, centralized repository of verified information, higher education institutions improve operational efficiency, data consistency, and service delivery while minimizing errors associated with manual record management (Laudon & Laudon, 2022).

Digital transformation in higher education has demonstrated that centralized information systems significantly enhance institutional coordination by integrating administrative processes into a single platform (Bond et al., 2020). Kapoh et al. (2024) observe that digital internship management systems simplify administrative operations by automating routine activities such as opportunity publication, student registration, application management, and progress monitoring. Similarly, Husin et al. (2024) found that centralized web-based internship management systems reduce confusion arising from fragmented communication channels and improve coordination between universities and students.

### 2.3.2 Automation of Internship Application and Placement Processes

Manual internship application procedures often result in processing delays, misplaced documents, duplicated records, and difficulties in tracking student applications. Automating application and placement processes enables students to search available internship opportunities, submit applications electronically, receive placement notifications, and monitor application status through an online portal. Likewise, academic administrators can efficiently

review applications, approve placements, and maintain complete digital records throughout the internship lifecycle (Stair & Reynolds, 2023).

Automated workflows reduce processing time, improve transparency, and enhance accountability throughout the placement process while minimizing human errors associated with manual data entry and document handling (Laudon & Laudon, 2022). Okodan (2024) notes that automated internship management systems streamline registration, placement selection, and internship approval processes, thereby improving institutional efficiency and student satisfaction.

### 2.3.3 Real-Time Communication and Notifications

Poor communication between universities, students, and host organizations remains one of the major challenges affecting internship coordination. Delayed dissemination of information regarding internship opportunities, reporting dates, application deadlines, supervisor feedback, and assessment schedules often results in missed opportunities and increased administrative workload (Bond et al., 2020).

Modern internship information systems incorporate integrated communication tools that automatically notify users through email, SMS, or in-system notifications whenever important events occur. These notification mechanisms ensure timely dissemination of internship opportunities, interview schedules, placement confirmations, submission reminders, and supervisor feedback, thereby improving stakeholder coordination and reducing communication gaps (O'Brien & Marakas, 2021). Real-time communication also enhances responsiveness and improves user satisfaction by ensuring that critical information reaches stakeholders promptly.

### 2.3.4 Digital Document Management

Traditional internship management relies heavily on printed documents, including application letters, recommendation forms, acceptance letters, logbooks, assessment forms, and internship reports. Paper-based document management increases storage costs, complicates document retrieval, and exposes institutional records to risks of loss, damage, and unauthorized access (ISO, 2022).

Digital document management systems provide secure repositories where internship-related documents are uploaded, organized, retrieved, and archived electronically. Electronic storage facilitates faster document retrieval, enhances record preservation, improves information security, and significantly reduces operational costs associated with paper-based administration

(Laudon & Laudon, 2022). Furthermore, authorized users can remotely access required documents without physically visiting university administrative offices, thereby improving institutional efficiency and service accessibility.

### 2.3.5 Enhanced Collaboration Among Stakeholders

Successful internship programmes depend on effective collaboration among students, internship coordinators, academic supervisors, and host organizations. However, fragmented communication channels often create misunderstandings regarding student placement, supervision schedules, assessment procedures, and reporting requirements (Jackson, 2015).

Integrated internship information systems strengthen collaboration by providing shared access to internship records, communication platforms, supervision reports, and evaluation forms. Stakeholders exchange information within a common digital environment, reducing delays associated with multiple communication platforms and improving transparency throughout the internship process (Project Management Institute [PMI], 2021). Structured collaboration enhances coordination, clarifies stakeholder responsibilities, and contributes to improved internship outcomes.

### 2.3.6 Continuous Monitoring and Supervision

Monitoring internship progress is often challenging when institutions rely primarily on physical supervision visits and manual reporting mechanisms. Limited supervision reduces opportunities for early identification of student challenges and may negatively affect internship learning outcomes (Jackson, 2015).

Contemporary internship management systems support continuous monitoring through electronic logbooks, online supervisor evaluations, attendance tracking, digital progress reports, and automated feedback mechanisms. These tools enable academic supervisors to remotely review student progress, provide timely guidance, and identify performance concerns throughout the internship period rather than waiting until final assessment (Assalaarachchi et al., 2024). Continuous digital supervision improves monitoring efficiency while strengthening communication between universities, supervisors, and students.

### 2.3.7 Data Analytics and Decision Support

Effective institutional planning requires reliable information regarding internship placements, employer participation, student performance, completion rates, and programme effectiveness.

Manual record management systems frequently generate incomplete, inconsistent, and outdated data, making evidence-based decision-making difficult (Laudon & Laudon, 2022).

Internship information systems incorporate analytical dashboards that generate reports on internship opportunities, placement trends, employer participation, student performance, completion rates, and supervisor evaluations. These analytical capabilities support evidence-based planning, policy formulation, and continuous improvement of internship programmes (Power, 2020). University administrators can utilize such insights to identify placement gaps, strengthen employer partnerships, allocate resources effectively, and improve internship policies through informed decision-making.

### 2.3.8 Strengthening University–Industry Partnerships

Strong partnerships between universities and host organizations are fundamental to sustainable internship programmes because they facilitate experiential learning and improve graduate employability (Jackson, 2015).

Digital internship platforms strengthen university–industry collaboration by enabling organizations to register, advertise internship vacancies, review student applications, submit evaluations, and communicate directly with university coordinators through integrated digital systems (Husin et al., 2024). Such systems improve transparency, simplify recruitment processes, and enable universities to maintain updated databases of internship providers and available opportunities. Digital collaboration platforms therefore contribute to long-term institutional relationships with employers while improving the overall quality of work-integrated learning experiences (OECD, 2021).

## 2.4 Requirements for an Internship Opportunities Information System

### 2.4.1 Functional Requirements

Functional requirements describe the specific services, operations, and processes that a system must perform to satisfy user needs and achieve its intended objectives (Sommerville, 2019). They define the interactions between users and the system and specify the activities that the system should support to facilitate effective operation (Pressman & Maxim, 2020). The system should support several core functions that facilitate internship opportunity management, application processing, communication, and reporting.

User Registration and Authentication. The system should enable students, employers, internship coordinators, and administrators to register and securely access the platform through

unique user accounts. This functionality should be implemented through user registration forms, login interfaces, password management mechanisms, and role-based access controls. The purpose of this function is to ensure that only authorized individuals can access specific resources and perform designated activities within the system. According to Stallings (2018), authentication and access control mechanisms are fundamental components of secure information systems because they protect sensitive information from unauthorized access. Similarly, Laudon and Laudon (2022) note that user authentication enhances accountability and strengthens security in web-based system.

Internship Opportunity Posting and Management. The system should enable employers and internship coordinators to create, update, publish, and remove internship opportunities. Through structured electronic forms, authorized users should be able to enter details such as internship title, organization name, location, duration, application deadlines, required qualifications, and available positions. This functionality aims to ensure timely dissemination of internship opportunities and facilitate efficient management of internship information. Research by Apriani et al. (2022) found that web-based internship management systems improve the efficiency of internship advertisement and reduce delays associated with manual information dissemination. Similarly, Hamidi et al. (2017) observed that digital internship platforms improve coordination between educational institutions and host organizations.

Internship Opportunity Search and Filtering. The system should provide students with tools for searching, sorting, and filtering available internship opportunities according to predefined criteria such as location, organization, field of study, duration, and application deadlines. Search functionality should enable users to quickly identify opportunities that match their academic and career interests. According to Shneiderman et al. (2018), effective search and filtering mechanisms significantly improve information retrieval and user satisfaction in information systems. In internship management environments, search functionalities improve accessibility and reduce the time required to locate relevant opportunities (Rahmi & Imilda, 2023).

Student Application Submission. The system should enable students to submit internship applications electronically. Through online application forms, students should be able to upload supporting documents such as curriculum vitae, academic transcripts, recommendation letters, and cover letters. This functionality eliminates the need for paper-based submissions and facilitates efficient processing of applications. According to Subari et al. (2018), electronic

application systems improve document management, reduce administrative workload, and enhance application processing efficiency. Likewise, O'Brien and Marakas (2021) note that digital submission systems improve data accuracy and accessibility.

Application Tracking and Status Updates. The system should allow students to monitor the progress of their internship applications in real time. Through personalized dashboards, applicants should be able to view application statuses such as submitted, under review, shortlisted, accepted, or rejected. This functionality promotes transparency and reduces uncertainty among applicants. Research by Zulfallah and Hidayatuloh (2021) indicates that application tracking mechanisms improve user satisfaction and facilitate efficient monitoring of internship processes. Real-time status updates also reduce the need for manual follow-up communication between students and coordinators (Apriani et al., 2022).

Employer Profile Management. The system should support the creation and maintenance of employer profiles. Organizations should be able to register, update institutional information, upload organizational descriptions, and manage internship postings through dedicated employer accounts. This functionality helps students obtain relevant information about potential internship providers and supports institutional collaboration. According to Laudon and Laudon (2022), organizational profile management features improve information quality and support stakeholder engagement within information systems.

Notification and Communication Services. The system should facilitate communication among students, employers, supervisors, and internship coordinators through notifications, alerts, and messaging functionalities. Notifications should inform users about application deadlines, status changes, new internship opportunities, and important announcements. Effective communication mechanisms improve stakeholder coordination and information sharing. According to Avison and Fitzgerald (2020), integrated communication features enhance collaboration and improve operational efficiency in information systems. Similarly, Hamidi et al. (2017) found that communication modules significantly improve coordination among internship stakeholders.

Internship Reporting and Analytics. The system should generate reports related to internship opportunities, student applications, placement statistics, employer participation, and internship outcomes. Through reporting dashboards and analytical tools, administrators should be able to monitor internship activities and support evidence-based decision-making. Stair and Reynolds (2021) argue that reporting and analytics functionalities are essential for managerial decision-

making, performance evaluation, and organizational planning. Rahmi and Imilda (2023) similarly identified reporting capabilities as a critical feature of effective internship management systems.

Administrator Management Functions. The system should provide administrative tools for managing users, internship records, employer accounts, system configurations, and access permissions. Administrators should be able to monitor system activities, maintain data integrity, and oversee overall system operations. According to Pressman and Maxim (2020), administrative controls are necessary for ensuring effective governance, system maintenance, and operational sustainability.

These functionalities are consistent with modern web-based internship management systems that support information dissemination, application management, communication, and monitoring activities within higher education institutions (Hamidi et al., 2017; Apriani et al., 2022; Rahmi & Imilda, 2023).

### 2.4.2 Non-Functional Requirements

Non-functional requirements define the quality attributes, operational standards, and performance characteristics that determine how effectively a system performs its functions (Sommerville, 2019). These requirements significantly influence user satisfaction, system acceptance, and long-term sustainability (Pressman & Maxim, 2020).

Usability. The system should be easy to learn, understand, and use by students, employers, and administrators. Through intuitive interfaces, clear navigation structures, and consistent design principles, users should be able to complete tasks with minimal training. According to Lazar et al. (2017), usability is a critical determinant of user acceptance and system effectiveness. Well-designed interfaces improve user experience and encourage continued system usage.

Reliability. The system should consistently perform intended functions without unexpected failures or interruptions. Through robust system architecture, data backup procedures, and error-handling mechanisms, the system should maintain dependable operation. Pressman and Maxim (2020) emphasize that reliability is essential for systems that support organizational processes and information management activities.

Security. The system should protect user data and system resources from unauthorized access, modification, or disclosure. Security should be achieved through authentication mechanisms, encryption technologies, secure data storage, and role-based access control. According to

Stallings (2018), security is a fundamental requirement for information systems that process personal and organizational information.

Performance Efficiency. The system should provide fast response times and efficient processing of user requests. It should be capable of handling multiple concurrent users without significant degradation in performance. Sommerville (2019) notes that performance efficiency directly affects user satisfaction and operational effectiveness in web-based applications.

Scalability. The system should support growth in the number of users, internship opportunities, applications, and stored records. Through scalable architecture and flexible database design, the system should accommodate future expansion without requiring major redesign. Tanenbaum and Bos (2015) recommend scalable system architectures for applications expected to experience increasing workloads over time.

Availability. The system should be accessible whenever users need to access internship information and services. Through reliable hosting infrastructure, backup mechanisms, and continuous monitoring, downtime should be minimized. According to Laudon and Laudon (2022), system availability is essential for maintaining continuous access to organizational information resources.

Maintainability. The system should be designed to facilitate updates, modifications, and troubleshooting activities. Through modular architecture, proper documentation, and standardized development practices, maintenance activities should be performed efficiently. Sommerville (2019) argues that maintainability contributes significantly to the long-term sustainability and adaptability of information systems.

These quality attributes are widely recognized as critical success factors in web-based information system implementation and sustainability (OECD, 2022; Pressman & Maxim, 2020).

### 2.4.3 Hardware Requirements

Hardware requirements refer to the physical devices and infrastructure necessary to support system operation, data processing, storage, and user access (International Telecommunication Union, 2023).

Smartphones. Smartphones should support mobile access to the system through responsive web interfaces. Students and employers should be able to access internship information, submit applications, and receive notifications using internet-enabled mobile devices. Mobile

technologies have become essential tools for digital service delivery in educational environments (World Bank, 2021).

Laptops and Desktop Computers. Personal computers should provide access to all system functionalities, including administration, application management, reporting, and data analysis. Computers remain important devices for performing tasks that require extensive data entry and document management (OECD, 2022).

Internet Connectivity Infrastructure. Reliable internet connectivity is required to facilitate communication between users and the web-based platform. Internet infrastructure enables real-time access to internship opportunities, application submissions, and communication services. According to the ITU (2023), internet connectivity is a fundamental requirement for effective operation of web-based systems.

Cloud or Institutional Server Infrastructure. The system should be hosted on cloud-based or institutional server infrastructure capable of storing data, processing requests, and supporting multiple users simultaneously. Cloud computing environments provide scalability, flexibility, and improved availability for web-based applications (Mell & Grance, 2011). Centralized server infrastructure also enhances data management and system administration (ITU, 2023).

### 2.4.4 Software Requirements

Software requirements refer to the applications, platforms, and supporting technologies required for the operation and maintenance of the system (Laudon & Laudon, 2022).

Web Browsers. Web browsers such as Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari should be used to access the system. Browsers provide a standardized interface for interacting with web-based applications and eliminate the need for specialized client software (World Wide Web Consortium, 2021).

Database Management Systems (DBMS). A relational database management system such as MySQL or PostgreSQL should be used to store and manage internship opportunities, user accounts, applications, and reports. Database systems improve data integrity, consistency, and retrieval efficiency (Silberschatz, Korth, & Sudarshan, 2019).

Web Application Frameworks. Development frameworks such as Laravel, Django, Spring Boot, or Node.js should be utilized to support application development and deployment. Frameworks improve development efficiency, maintainability, security, and scalability of web-based systems (Pressman & Maxim, 2020).

Authentication and Authorization Mechanisms. Authentication and authorization software components should be implemented to verify user identities and enforce access control policies. Role-based access control ensures that users access only information and services relevant to their responsibilities (Stallings, 2018).

Reporting and Analytics Tools. Reporting tools should support generation of internship statistics, application summaries, placement reports, and performance indicators. Analytical capabilities facilitate monitoring, evaluation, and evidence-based decision-making. According to Stair and Reynolds (2021), reporting technologies are essential for organizational planning and performance management.

These software components form the technological foundation required for the successful implementation and operation of a web-based Internship Opportunities Information System within EASLIS and are widely adopted in contemporary educational information systems (Laudon & Laudon, 2022; OECD, 2022; Pressman & Maxim, 2020).

### 2.5 Development of an Internship Opportunities Information System

System development encompasses the design of system architecture, databases, user interfaces, and implementation approaches that collectively support efficient management of internship opportunities and related processes. Information systems scholars emphasize that effective system development is essential for ensuring system quality, usability, performance, and long-term sustainability (Laudon & Laudon, 2022; Pressman & Maxim, 2020). In educational environments, system development must also support accessibility, information sharing, stakeholder collaboration, and efficient management of academic support services.

#### System Architecture Design

System architecture defines the overall structure of a system and specifies how software components, databases, users, and communication mechanisms interact to achieve organizational objectives. According to Sommerville (2019), a well-designed architecture improves maintainability, scalability, reliability, and overall system performance.

For an Internship Opportunities Information System, a web-based client-server architecture was widely considered appropriate. Under this architecture, students, employers, internship coordinators, and administrators should access the system through web browsers, while system processing and data storage should be managed centrally on a server. This arrangement enables real-time access to internship information, facilitates centralized data management, and ensures

consistency of records across all users. Laudon and Laudon (2022) note that centralized architectures improve system control, security, and administrative efficiency by maintaining a single source of organizational data.

Furthermore, modern information systems frequently adopt modular architectures in which individual system functions are separated into independent but interconnected components. According to Pressman and Maxim (2020), modular design improves maintainability and allows developers to modify or update specific functionalities without affecting the entire system. This approach is particularly beneficial for internship management systems because different stakeholders interact with different system functionalities while sharing common data resources.

The developed Internship Opportunities Information System, the architecture was organized into several key modules.

**User Management Module**

The User Management Module should manage registration, authentication, authorization, and profile management for students, employers, internship coordinators, and administrators. Through role-based access control mechanisms, users should only access functionalities relevant to their responsibilities. According to Stallings (2018), authentication and authorization mechanisms are fundamental for protecting information systems from unauthorized access and ensuring accountability among users. In internship management environments, user management supports secure interactions among multiple stakeholder groups.

**Internship Opportunity Management Module**

This module should support the creation, updating, approval, publication, and removal of internship opportunities. Employers and internship coordinators should be able to post internship vacancies, specify requirements, indicate deadlines, and update placement information. Studies by Hamidi et al. (2017) and Apriani et al. (2022) indicate that centralized internship opportunity management improves information dissemination and reduces delays associated with manual communication channels.

### Internship Search and Application Module

The Internship Search and Application Module should enable students to search, filter, and apply for available internship opportunities. Search functionality may allow filtering by organization, location, internship category, duration, and application deadline. According to Shneiderman et al. (2018), efficient search and retrieval mechanisms significantly improve information accessibility and user satisfaction in web-based systems. Rahmi and Imilda (2023) similarly found that digital internship platforms improve accessibility to internship information and facilitate faster application processes.

### Communication and Notification Module

The system should include communication features that facilitate interaction among students, employers, and internship coordinators. Notifications may inform users about newly posted opportunities, application deadlines, interview invitations, and application status updates. Avison and Fitzgerald (2020) argue that integrated communication mechanisms improve coordination and information sharing among stakeholders. Effective communication is particularly important in internship management because it reduces delays and enhances transparency throughout the internship process.

### Reporting and Analytics Module

The Reporting and Analytics Module should support generation of reports related to internship opportunities, applications, placements, employer participation, and student engagement. Through dashboards and analytical tools, administrators should be able to monitor internship activities and evaluate programme performance. According to Stair and Reynolds (2021), reporting functionalities provide valuable insights that support organizational planning, decision-making, and performance evaluation. Rahmi and Imilda (2023) similarly identified reporting and analytics as essential components of internship management systems.

### Administration Module

The Administration Module should provide overall system control and monitoring capabilities. Administrators should be able to manage user accounts, configure system settings, maintain records, monitor system usage, and enforce institutional policies. Pressman and Maxim (2020) emphasize that administrative controls contribute significantly to system governance, operational efficiency, and long-term sustainability.

### Database Design

Database design is a critical component of information system development because it determines how data is structured, stored, managed, and retrieved. According to Elmasri and Navathe (2020), effective database design improves data integrity, minimizes redundancy, and enhances system performance.

The Internship Opportunities Information System should utilize a relational database to manage internship opportunities, student profiles, employer records, applications, notifications, and reports. Proper database design is essential for ensuring consistency and reliability in internship information management (Silberschatz, Korth, & Sudarshan, 2019).

### User Interface Design

User interface design determines how users interact with system functionalities and information resources. A well-designed interface improves usability, accessibility, and overall user satisfaction. According to Lazar, Feng, and Hochheiser (2017), user-centered interface design enhances system adoption and reduces barriers to effective use.

For an Internship Opportunities Information System, the user interface should be simple, intuitive, responsive, and accessible across different devices. Students should be able to easily browse internship opportunities, submit applications, and monitor application progress. Employers should be able to manage internship postings efficiently, while administrators should be able to oversee system operations without unnecessary complexity. Research in human-computer interaction consistently demonstrates that systems designed around user needs achieve higher acceptance rates and greater operational effectiveness (Alter, 2017).

Given that users may possess varying levels of digital literacy, interface simplicity and ease of navigation are particularly important. Clear menus, consistent layouts, responsive design, and user-friendly forms contribute significantly to positive user experiences and successful system adoption (Nielsen, 2020).

### System Development Approach

The choice of development methodology influences how effectively system requirements are translated into a working solution. Traditional development approaches such as the Waterfall Model follow a sequential process consisting of requirements analysis, design, implementation, testing, deployment, and maintenance. While structured and easy to manage, these approaches

often struggle to accommodate changing user requirements during development (Whitten, Bentley, & Dittman, 2020).

Contemporary information systems increasingly utilize Agile development methodologies because they emphasize iterative development, continuous feedback, and incremental delivery of system functionality. According to Pressman and Maxim (2020), Agile approaches improve system quality by enabling developers to respond quickly to changing requirements and user feedback.

For an Internship Opportunities Information System, Agile development is particularly suitable because stakeholder requirements may evolve as students, employers, and coordinators interact with system prototypes. Continuous user involvement helps ensure that the final system aligns closely with organizational needs and user expectations. Ali and Miller (2017) found that iterative development approaches improve stakeholder satisfaction and increase the likelihood of successful system implementation.

### 2.6 Research Gap

Although internship management systems and web-based internship platforms have been widely studied, the majority of existing research has focused on general internship administration, student placement management, and monitoring of internship activities within universities, government agencies, and computing-related academic programmes. Studies by Hamidi et al. (2017), Pratama et al. (2017), Apriani et al. (2022), and Rahmi and Imilda (2023) demonstrate the effectiveness of digital systems in improving internship coordination, record management, communication, and reporting. However, these studies largely address generic internship management processes and are not specifically tailored to the unique requirements of Library and Information Science (LIS) education.

Furthermore, existing literature primarily emphasizes the technical development and operational functionalities of internship management systems, such as application processing, placement tracking, and report generation, while providing limited attention to the management and dissemination of internship opportunities themselves.

Additionally, there is limited documented research on internship opportunities information systems developed specifically for Library and Information Science schools in developing countries, particularly within the Ugandan higher education context.

This study therefore sought to address this gap by developing an internship opportunities information system to improve access to internship opportunities and support effective decision-making within EASLIS.

# CHAPTER THREE: RESEARCH METHODOLOGY

## 3.0 Introduction

This section presents the methodology that was used in the development an internship opportunities information system for EASLIS. It outlines the research design that was adopted, the study area, and the characteristics of the study population from which relevant data was obtained. In addition, it describes the sampling techniques, data collection methods and tools, as well as the approaches to data analysis and quality control that were employed not forgetting the system design of the developed system. Ethical considerations that guided the study are also highlighted.

## 3.1 Research Design

The study adopted a case study research design to examine existing internship opportunities management practices and to guide the development of an internship opportunities information system for EASLIS.

A case study research design involves an in-depth investigation of a specific real-life setting or organization to understand a phenomenon within its natural context (Yin, 2014). The case study approach was appropriate because it allowed for a detailed examination of how internship opportunities were currently accessed at EASLIS, including the challenges associated with existing internship opportunities management practices and access methods.

The choice of this design was informed by its suitability for exploratory research. It provided an opportunity to understand how internship opportunities were organized, accessed, and managed within the school, while identifying gaps that affect timely access to such opportunities by students. Through this approach, it became possible to generate context-specific insights that informed the design of a system that responded directly to the needs of students and other stakeholders at the school.

In addition, the case study design supported the integration of both qualitative and quantitative data collection methods. This enabled the collection of comprehensive data from different categories of users, especially students, thereby ensuring that the developed system reflected actual user requirements and operational workflows. As a result, the system design was grounded in the realities of the school and aligned with its internship opportunities management and objectives.

### 3.2 Study Approach

The study adopted a mixed-methods approach combined with a modular application design strategy to guide the design and development of the internship opportunities information system for EASLIS. A mixed-methods approach involves the systematic integration of qualitative and quantitative techniques to achieve a comprehensive understanding of a problem and to inform both analysis and application design decisions (Creswell & Plano Clark, 2017).

The qualitative component of this study was used to explore existing internship opportunities access practices, challenges, and user needs within the EASLIS. This involved collecting descriptive data on how internship opportunities were accessed, the limitations of existing dissemination channels such as noticeboards, emails, and informal communication networks, and user expectations for improved centralized access through a web-based system. The quantitative component was used to measure developed system requirements and evaluation indicators, including frequency of internship opportunity access, submission patterns, and user interaction levels with internship-related information. Such data was essential in defining system specifications and assessing system performance after implementation.

In addition to the mixed-methods approach, the study adopted a modular system design approach. Modular design involves dividing the system into independent but interconnected components that can be developed, tested, and maintained separately while functioning as a unified system. According to Sommerville (2019), modularization reduces system complexity and enhances maintainability by allowing individual components to be modified without affecting the entire system. This approach is widely applied in modern web-based information systems where scalability, flexibility, and continuous improvement are required.

Different functional modules such as user management, internship opportunity posting, application processing, and notification services were developed as separate components while remaining fully integrated within the system. This supported gradual system enhancement, easier maintenance, and potential integration with other institutional systems.

As noted by Pressman and Maxim (2020), modular development approaches improve system reliability and simplify future upgrades, particularly in complex institutional environments where multiple user categories interact with the system.

The justification for combining a mixed-methods research approach with modular system design lied in the nature of the EASLIS environment, where internship needs vary across

students, academic staff, and administrative units. Literature indicates that integrating empirical user data with flexible system design approaches improves the relevance, usability, and effectiveness of information systems (Creswell & Plano Clark, 2017; Sommerville, 2019). This ensured that the developed Internship Opportunities Information System remains aligned with institutional requirements while allowing for future scalability and adaptation.

### 3.3 Area of the study

The study was conducted primarily at EASLIS, Makerere University, Kampala, Uganda.

### 3.4 Study Population

A study population refers to the entire group of individuals, objects, or entities relevant to a particular study, serving as the source from which samples are selected for empirical investigation (Creswell & Creswell, 2018). For this study, the population was specifically defined to ensure that all perspectives and operational realities pertinent to the development of the developed internship opportunities information system for EASLIS were adequately represented.

According to Makerere University academic enrolment records, EASLIS has an estimated study population of approximately 1,050 students, supported by about 21 academic staff and administrative personnel, bringing the total institutional population to roughly 1,071 members (Makerere University, 2025).

This population included undergraduate and postgraduate students, lecturers, and support staff who were directly involved in teaching, academic supervision, and administrative coordination within the school. The students formed the largest user group and are the primary beneficiaries of internship opportunity dissemination and placement services.

#### 3.4.1 Sample

The target population for this study consisted of personnel affiliated with EASLIS, Makerere University, estimated at approximately 1,071 individuals, comprising about 1,050 students, 21 academic staff and administrative personnel (Makerere University, 2025). From this population, the study drew a representative sample of respondents who are directly involved in the access, dissemination, and management of internship opportunities within the school.

The study focused on three key respondent categories, who were selected based on their functional involvement in internship-related processes. These included students, academic staff (including internship coordinators), and administrative/ICT support personnel.

Students were the primary respondents because they are the direct beneficiaries of internship opportunities. They actively search for internship placements, submit applications, and rely on institutional systems for timely access to internship information. Their input was critical in assessing usability, accessibility, and effectiveness of the developed Internship Opportunities Information System.

Academic staff and internship coordinators were included because they play a central role in guiding students, approving internship placements, liaising with host organizations, and supervising internship activities. Their perspectives were essential in evaluating system functionality, workflow efficiency, and institutional coordination of internship processes.

Administrative and ICT personnel were also included because they are responsible for managing institutional systems, maintaining digital infrastructure, and supporting information dissemination platforms. Their input was important in assessing system feasibility, technical requirements, security, and long-term sustainability.

For determination of the sample size, the study was adopted the Krejcie and Morgan (1970) sample size determination table, which provided a scientifically accepted method for selecting representative samples from known populations. Based on a population of 1,071, the Krejcie and Morgan table recommends a sample size of approximately 285 respondents.

To ensure proportional representation of all stakeholder groups, the sample was distributed as follows:

Table 1: Shows the sample size distribution of the study

| **Category** | **Sample Size** |
|---|---|
| Students | 262 |
| Academic Staff | 14 |
| Administrative Staff | 5 |
| ICT Personnel | 4 |
| Total | 285 |

Given the relatively defined and manageable population of EASLIS, the study adopted a combination of purposive sampling and simple random sampling techniques.

The sampling techniques were applied according to the roles and involvement of each respondent category in internship-related processes within EASLIS.

Table 2: Shows the sampling techniques application to roles and respondent involvement.

| **Respondent Category** | **Sample Size** | **Sampling Technique** | **Justification** |
|---|---|---|---|
| Students | 262 | Simple Random Sampling | To ensure equal representation of students who are the primary users of internship opportunities |
| Academic Staff (Internship Coordinators & Lecturers) | 14 | Purposive Sampling | These were selected due to their role in supervising, coordinating, and approving internship activities |
| ICT Personnel | 4 | Purposive Sampling | These were selected due to their role in managing institutional systems and ICT infrastructure. |
| Administrative Staff | 5 | Purposive Sampling | These were elected because of their responsibility as school leadership and overall authority |

**Purposive Sampling**

Purposive sampling was used to select respondents who possessed specialized knowledge and direct involvement in internship management and institutional information systems. This technique involved deliberately selecting participants based on their relevance to the objectives of the study. According to Creswell (2014), purposive sampling is appropriate in studies that require in-depth insights from individuals with specific professional roles and expertise.

**Purposive sampling was applied to the following categories:**

*Academic Staff (Internship Coordinators & Lecturers)*

Academic staff were purposively selected because they are responsible for guiding students through internship placement processes, approving internship applications, liaising with

external host organizations, and supervising students during industrial training. Their participation provided critical insights into current internship coordination practices, institutional challenges, and functional requirements for the developed system.

*Administrative and ICT Personnel*

Administrative and ICT personnel were purposively selected due to their responsibility for managing institutional ICT infrastructure, supporting digital systems, and facilitating information dissemination within EASLIS. Their input was essential in assessing system feasibility, technical requirements, security considerations, and long-term sustainability of the developed Internship Opportunities Information System.

**Simple Random Sampling**

Simple random sampling was used to select students from the identified population of EASLIS. This technique ensured that every student has an equal chance of being included in the study, which thereby reduced selection bias and improved the representativeness of findings. According to Babbie (2020), simple random sampling enhances objectivity and reliability in quantitative and user-centered system studies.

A list of registered students within EASLIS were obtained from the academic registry. Each student was assigned a unique number, after which a random selection procedure (such as a computer-based random number generator) was used to identify participants for inclusion in the study. This process ensured fairness, transparency, and equal representation of student experiences regarding internship opportunity access and usage of information systems.

Justification of the Mixed Sampling Approach

The combination of purposive and simple random sampling was appropriate for this study because it supported both qualitative and quantitative dimensions of system development research. Purposive sampling ensured that expert knowledge from academic staff and ICT personnel informed system requirements, design considerations, and feasibility analysis. In contrast, simple random sampling ensured that student perspectives representing the largest user group were fairly captured.

In information systems research, mixed sampling approaches are widely recommended because they improve the validity, reliability, and practical applicability of findings used in system design and development (Creswell, 2014; Babbie, 2020). This ensured that the

developed system was not only technically sound but also aligned with user needs and institutional realities at EASLIS, Makerere University.

### 3.5 Data Collection Methods

Data collection methods refer to the systematic techniques used by a researcher to gather relevant information from respondents, documents, or real-world settings in order to answer research questions and achieve study objectives (Creswell & Creswell, 2018). These methods are essential in ensuring that research findings are valid, reliable, and grounded in accurate evidence (Saunders et al., 2023).

In social science and information systems research, common data collection methods include interviews, questionnaires, observation, and document review. These methods are widely used either individually or in combination depending on the nature of the study and the type of data required (Saunders et al., 2023; Kothari, 2019).

#### 1) Semi-Structured Interviews

Semi-structured interviews were conducted with purposively selected respondents, including academic staff (internship coordinators), ICT personnel, and selected administrative staff within EASLIS. An interview guide was used to ensure consistency which allowed flexibility for participants to elaborate on their experiences.

The interviews focused on current internship opportunity dissemination practices, challenges in accessing internship information, coordination issues, and user expectations for a centralized web-based system. According to Creswell (2014), semi-structured interviews are particularly effective in exploring complex system requirements because they allow the researcher to probe emerging issues in depth while maintaining methodological consistency.

#### 2) Questionnaire

A structured questionnaire was administered to a broader group of students within EASLIS. The questionnaire collected quantitative data on internship opportunity access patterns, frequency of use of existing communication channels, application behaviours, and perceived challenges in accessing internship information.

This method supported the collection of measurable data that was statistically analysed to inform system design requirements. According to Babbie (2020), questionnaires are effective

tools for gathering standardized data from large populations, thereby improving generalizability and supporting evidence-based system development decisions.

**3) Observation**

Observation was used to examine how students and staff accessed and shared internship opportunities within EASLIS. This involved non-participant observation of existing processes such as notice board usage, email communication, departmental announcements, and informal sharing of internship information.

Observation was important in identifying real-world challenges such as delays in information dissemination, duplication of internship postings, and inefficiencies in current communication channels. According to DeWalt and DeWalt (2011), observational methods provide direct insight into actual user behaviour, thereby improving the validity of system requirements analysis.

**4) Document Review and Analysis**

Secondary data was collected through a review of relevant institutional documents, including internship guidelines, departmental records, student internship reports, and policy documents within EASLIS and Makerere University.

In addition, scholarly literature on internship management systems were reviewed to provide a theoretical foundation for the study. Document analysis is widely used in information systems research because it helps align system design with institutional policies and existing workflows (Creswell, 2014). It also supports triangulation by complementing primary data sources.

### 3.6 Data Collection Instruments

To support the above data collection methods, the study employed the following instruments:

**1) Interview Guides**

Semi-structured interview guides were developed for academic staff, ICT personnel, and internship coordinators. These guides facilitated in-depth discussions on internship management practices, challenges in disseminating opportunities, and expectations for a centralized internship information system.

The flexible structure of the interview guides allowed respondents to provide detailed insights into system limitations and desired improvements. This ensured that rich qualitative data was obtained to support system design decisions (Creswell, 2018). (Appendix I, II and III)

**2) Questionnaires**

Structured questionnaires were administered to students across EASLIS to collect quantitative data on internship opportunity access, usage of current communication channels, application behaviours, and system requirements.

The questionnaires included closed-ended questions which ensured ease of analysis and comparability of responses. Data collected was used to identify trends, user preferences, and common challenges affecting internship opportunity access. Questionnaires were administered electronically using Google Forms, which facilitated accessibility and data collection efficiency.

**3) Document Analysis Guide**

A document analysis guide was used to systematically review institutional documents such as internship guidelines, departmental reports, student internship records, and policy documents.

This instrument helped the research team extract relevant information regarding current internship management practices, institutional requirements, and identified gaps in internship opportunity dissemination. It also included review of related academic literature on internship management systems to support system design alignment with best practices. (Appendix VI )

**4) Observation Checklist**

An observation checklist was used to guide systematic recording of internship opportunity access and communication practices within EASLIS.

The checklist captured the category of user involved (student, academic staff, or administrator), method used to access internship information (notice board, email, online platforms.), type of internship information accessed or shared, time taken to locate internship opportunities and the success rate of accessing relevant internship information

The use of a structured checklist ensured consistency, accuracy, and comparability of observations across different users and sessions. According to DeWalt and DeWalt (2011), structured observation tools enhance the reliability and credibility of behavioural data in system analysis studies. (Appendix V )

### 3.7 Data Analysis

To extract meaningful insights that informed the design of a contextually system-based internship opportunities information system for EASLIS, the collected data was analyzed using a structured yet adaptable approach. The analysis integrated both qualitative and quantitative techniques to reflect the nature of the data sources and the study's objective of addressing practical user needs and operational inefficiencies.

#### 3.7.1 Data Presentation

The presentation of research findings were carefully structured to convey insights clearly, comprehensively, and in ways that supported informed decision-making for the developed system design. Multiple complementary formats were employed to communicate different aspects of the data effectively and to engage a diverse audience.

Qualitative findings were presented using thematic narrative summaries, where key patterns, user experiences, and operational challenges were organized into coherent themes. Thematic analysis guided this presentation approach, which allowed complex textual data to be reduced into meaningful categories for interpretation.

In addition, thematic tables were used to systematically display coded qualitative data, which showed the relationship between identified themes and stakeholder groups. This approach enhances transparency in qualitative reporting and supports structured interpretation of findings (Miles, Huberman, & Saldaña, 2014).

Selected verbatim interview excerpts were included to support key themes and provided authentic participant perspectives, which ensured that findings remained grounded in real user experiences.

Quantitative data were presented using descriptive statistical techniques, including frequencies, percentages, and comparative summaries. These were displayed using tables and graphical representations such as bar charts and pie charts, which are standard methods for summarizing survey data in information applications research.

Furthermore, findings that informed application design were presented through user requirement matrices and application screenshot outputs, which linked user needs directly to application features. This approach supports traceability between data collection, analysis, and system development outcomes, which is essential in system design research (Pressman & Maxim, 2020).

### 3.7.2 Data Quality Control

Data quality control refers to the systematic procedures used to ensure that research data is accurate, consistent, reliable, and valid throughout the data collection and analysis process. In qualitative and mixed-methods research, quality control is essential for enhancing the trustworthiness of findings, particularly in case study research where multiple data sources are used (Creswell & Creswell, 2018).

To ensure data quality, several strategies were applied during the research process, including triangulation, accurate documentation, and systematic verification of data sources. Triangulation was achieved by comparing findings from interviews, questionnaires, observation, and document review to improve the credibility and consistency of results.

Audio-recorded interviews were transcribed verbatim with participants' consent to ensure accurate representation of responses. This process enhances dependability and confirmability by preserving the original meaning and context of participants' views (Miles, Huberman, & Saldaña, 2014). Field notes collected during observation were reviewed immediately after each session and expanded to include contextual details and research team reflections, which improved the completeness and reliability of observational data.

For document review, a structured checklist was used to ensure consistency in extracting relevant information from EASLIS records. This reduces subjectivity and enhance systematic data handling and comparability across documents (Creswell, 2018).

### 3.7.3 Triangulation

Triangulation is a research strategy that involves using multiple methods, data sources, or theoretical perspectives to investigate a phenomenon (Denzin, 2020).

Methodological triangulation was employed across multiple data sources interviews, observations, and documents to cross-verify information and validate emerging themes.

This approach strengthened the study's internal validity by confirming that findings are consistent, comprehensive, and not biased by any single source or method. It provided a more robust and holistic understanding of an internship opportunities information system for EASLIS and its requirements.

### 3.8 Ethical Considerations

Ethical considerations were fundamental to conduct responsible research, which fostered trust, and also ensured that the dignity and rights of all participants were respected throughout the study.

#### Ethical Approval

Prior to data collection, formal ethical approval was sought from the Makerere University School of Library and Information Science Research Ethics Committee. This approval process ensured that the study complied with institutional ethical standards and safeguarded participants from potential harm. It also validated that the study procedures met acceptable academic and professional research conduct requirements.

#### Informed Consent

Informed consent was obtained from all participants before their involvement in the study. Participants were clearly informed about the purpose of the study, the procedures involved, the expected duration of participation, and how the data was used. This was done through an information sheet and explained verbally in cases where literacy levels may vary.

Consent was obtained either in written form or verbally, depending on participant's preference and context. Where verbal consent is used, it was recorded with permission. This process ensures that participation is voluntary and based on full understanding of the study, thereby respecting participant autonomy and reducing the risk of coercion (Wiles et al., 2021). Participants were also be informed that they have the right to withdraw from the study at any time without penalty, which upheld the principle of voluntary participation and non-maleficence.

#### Privacy and Confidentiality

To ensure privacy and confidentiality, all personal identifiers were removed from the data and replaced with codes or pseudonyms where necessary. This ensured that participants cannot be directly identified in the final report. All research data, including audio recordings, transcripts, and questionnaire responses, were securely stored on password-protected devices accessible only to the research team and academic supervisor.

These measures are intended to prevent unauthorized access, data misuse, or accidental disclosure of sensitive information, thereby maintaining data security and participant

confidentiality in line with established research ethics standards (British Psychological Society, 2021).

**Cultural Sensitivity and Access Permission**

The study was conducted with full respect for the cultural, social, and operational norms of the EASLIS. The research team observed appropriate protocols when engaging with participants which ensured respectful interaction within the school environment.

Prior to data collection, permission was obtained from the relevant administrative authorities within EASLIS at large. This ensured that the study was conducted with institutional awareness and community approval, which thereby promoted cooperation, trust, and ethical access to participants and records.

**Intellectual Property and Academic Integrity**

Intellectual property rights and academic integrity were strictly observed by appropriately citing all sources, materials, and data that were utilized in the study. Permissions was secured for the use or reproduction of proprietary content, and contributions to the development of the developed internship opportunities information system for EASLIS were formally acknowledged, thereby reinforcing responsible scholarship and ethical collaboration.

### 3.9 System Design Methodology

The system design phase translated the identified requirements into a concrete blueprint for the internship opportunities information system for EASLIS. This process followed a user-centered and modular design approach, which ensured that the final developed system was intuitive, efficient, and aligned with the specific operational context of EASLIS.

Modular Architecture: A modular architecture was adopted to ensure scalability, maintainability, and independent development of system components.

#### 3.9.1 System Development

The following technologies were employed in the development of the Internship Opportunities Information System to ensure reliability, scalability, maintainability, and cross-platform accessibility.

**Backend Development**

*Laravel*

Laravel was used as the primary backend framework for developing the system. The framework provided robust support for authentication, authorization, database management, API integration, and secure processing of internship-related transactions.

*PHP*

PHP was used as the server-side scripting language for implementing business logic, processing user requests, managing internship applications, and facilitating interaction between the system and the database.

*MySQL*

MySQL was used for database management due to its reliability, efficiency, and support for multi-user web applications. The database stores internship opportunities, student records, organization profiles, applications, placements, notifications, reports, and audit logs while ensuring data integrity and consistency.

**Frontend Development**

*HTML5*

HTML5 was used to develop the structural components of the system interfaces and web pages.

*CSS3*

CSS3 was used to enhance the visual appearance of the system through responsive layouts, styling, and user-friendly interface designs.

*JavaScript*

JavaScript was used to implement interactive functionalities and improve user experience through dynamic content updates and client-side validation.

*Bootstrap*

Bootstrap was utilized to create responsive interfaces that adapt to different screen sizes and devices, ensuring accessibility across desktops, tablets, and smartphones.

### 3.9.2. Development Tools

*Visual Studio Code*

Visual Studio Code was used as the primary Integrated Development Environment (IDE) for system development. The tool was selected because it supports multiple programming languages, provides extensive extension support, facilitates efficient debugging, and enhances developer productivity during coding, testing, and deployment activities.

*Wamp server*

Wamp server was used as the local development environment to host Apache, PHP, and MySQL services during system development and testing.

*Git and GitHub*

Git and GitHub were utilized for version control and source code management, enabling efficient tracking of system modifications and collaborative development.

## 3.10 System Testing

System testing was conducted to evaluate the functionality, usability, security, reliability, and overall performance of the developed Internship Opportunities Information System.

A total of 270 respondents who participated in the study were involved in the system testing phase. These comprised students, academic staff, administrative staff, and ICT personnel who interacted with the developed system and provided feedback through questionnaires and practical system usage exercises. The testing process focused on determining whether the system effectively addressed the internship information management challenges identified during the requirements analysis phase.

### 3.10.1 Functional Testing

Functional testing was conducted to verify whether the developed system performed its intended functions correctly and according to user requirements.

The project established that the system successfully supported user registration and authentication, internship opportunity posting, internship searching, online application submission, notification management, report generation, and administrative monitoring functions.

The project findings indicated that all core modules operated as expected and met the functional requirements specified during system design.

### 3.10.2 Unit testing

System testing was done after the system was coded. Individual units or components of the system were checked to ensure they are fully functional units before integrating them. This was done by examining each unit and that it performed as exactly intended.

### 3.10.3 System Usability Testing

System usability testing was conducted to assess user experiences while interacting with the developed Internship Opportunities Information System.

The 270 respondents who participated in the study were involved in the usability evaluation process. Feedback was collected using structured questionnaires based on a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

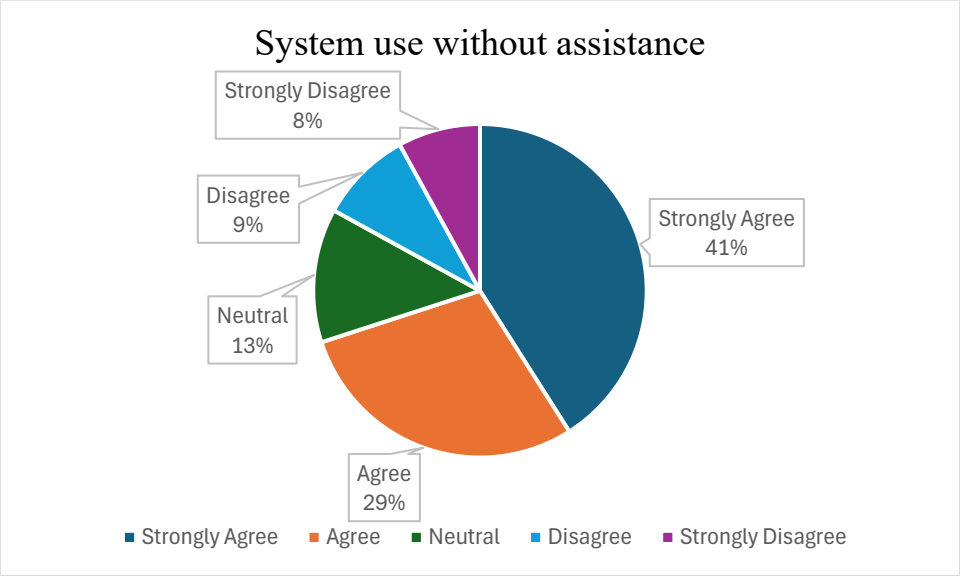
Table 3**:** Shows the System Usability Testing Questions

*(Scale: 1 = Strongly Disagree, 5 = Strongly Agree)*

| **No.** | **System Usability Testing Question** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|---|
| 1 | The system allows users to log in securely using their assigned credentials. | | | | | |
| 2 | The system interface is easy to navigate when searching for internship opportunities. | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3 | The system enables students to submit internship applications easily. | | | | | |
| 4 | Internship opportunities are displayed clearly and are easy to access. | | | | | |
| 5 | The system provides useful notifications regarding internship opportunities and application updates. | | | | | |
| 6 | Coordinators can efficiently monitor student internship applications and placements. | | | | | |
| 7 | The reporting functions generate useful and accurate internship information. | | | | | |
| 8 | Overall, the system is easy to use and supports internship management activities effectively. | | | | | |

Figure 1: Shows responses on the developed Internship Opportunities Information System use without assistance using the system usability scale




Results indicated that strongly agree had the highest responses with (41%), Agree (29%), strongly disagree (8%), neutral (13%) and disagree were (9%) responses. This proves that users need little or no assistance to use the developed system since majority of the responses were positive.

User feedback indicated that respondents appreciated the centralized access to internship opportunities, the simplicity of the application process, and the ease of navigating through different system functionalities.

Some respondents recommended the inclusion of additional user guides, frequently asked questions (FAQs), and orientation sessions to support first-time users and improve overall user experience.

### 3.10.4 Security and Data Validation Testing

Security testing was conducted to verify that sensitive internship information was adequately protected from unauthorized access.

The system employed role-based access control mechanisms that assigned permissions according to user categories including students, organizations, coordinators, administrators, and supervisors.

Authentication testing confirmed that users could successfully access the system using valid credentials while unauthorized login attempts were denied access. Invalid login details generated appropriate error messages without exposing sensitive system information.

Data validation testing established that the system rejected incomplete application forms, invalid email addresses, duplicate user accounts, and improperly formatted data entries. These validation mechanisms improved data quality and ensured consistency of records stored within the database.

Backup and recovery procedures were also tested successfully to ensure protection against accidental loss of internship records and user information.

### 3.10.5 Validation Against User Requirements

Validation testing was conducted to determine whether the developed system satisfied the requirements identified during the requirements analysis phase.

The system therefore met the functional and non-functional requirements identified during the study and provided a practical solution for managing internship opportunities within EASLIS.

### 3.10.6 Compatibility and Performance Testing

Compatibility testing was conducted to ensure that the system functioned consistently across different devices, operating systems, and web browsers.

The system was tested successfully using Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari browsers. The developed system maintained consistent functionality, interface layout, and responsiveness across all tested platforms.

Performance testing was conducted to evaluate the responsiveness of the system under multiple user interactions. The testing process established that the system successfully handled simultaneous internship searches, application submissions, notification processing, and report generation activities without significant performance degradation.

The findings confirmed that the web-based architecture and database infrastructure adequately supported concurrent access by multiple users while maintaining acceptable response times. This demonstrated the system's suitability for deployment within EASLIS and its ability to accommodate future growth in student and organizational participation.

### 3.11 Limitations

The study encountered several limitations that influenced the scope and depth of the study and developed system development. These are the limitations and the strategies that were employed to mitigate their impact as explained below:

#### 3.11.1 Limited Depth of Knowledge:

A limited depth of knowledge regarding certain advanced aspects of internship opportunity information system for EASLIS was initially present within the research team. To address this, an extensive review of current literature was undertaken, and consultations with subject matter experts was conducted to build a comprehensive understanding of the topic and inform the system design.

#### 3.11.2 Participant Reluctance

Some participants exhibited reluctance to provide exhaustive answers to specific questions, particularly in questionnaires, or to engage deeply during interviews. To mitigate this, participants were assured of confidentiality, the voluntary nature of their participation was emphasized, and user-friendly instruments were designed to encourage honest and complete responses. Where gaps remain, the analysis should transparently acknowledge these and rely on data from willing respondents, while considering follow-up interviews to fill critical gaps (Bryman, 2016).

### 3.11.3 Challenges in Software Customization

Challenges in software customization arose due to the inherent complexities of tailoring the system to specific organizational needs and, at times, limited prior experience with certain development frameworks. To overcome this, additional time was incorporated for learning relevant programming skills, and open-source modules were be utilized where appropriate to expedite the customization process.

### 3.11.4 Financial Constraints:

Financial constraints restricted the scope of data collection and system development, particularly regarding access to premium tools or extensive training resources. To manage this, the study prioritized essential activities and sought cost-effective data collection methods and also explored the use of freely available open-source technologies.

# CHAPTER FOUR: PRESENTATION AND DISCUSSION OF FINDINGS

## 4.0 Introduction

This chapter presents, analyses and discusses the findings of the project about the set objectives. The purpose of the project was to develop an internship opportunities management system for EASLIS. The objectives of the study were to; identify the existing internship opportunities management practices at EASLIS, find out the challenges of the current internship opportunities management practices, find out the solutions to the challenges of the current internship opportunities management practices at EASLIS, establish the requirements necessary for an internship opportunities information System and develop a web-based Internship Opportunities Information System for EASLIS.

## 4.1 Socio-demographic characteristics of the respondents

This section details the response rate, gender distribution and age of the respondents from the respondents who participated in the study.

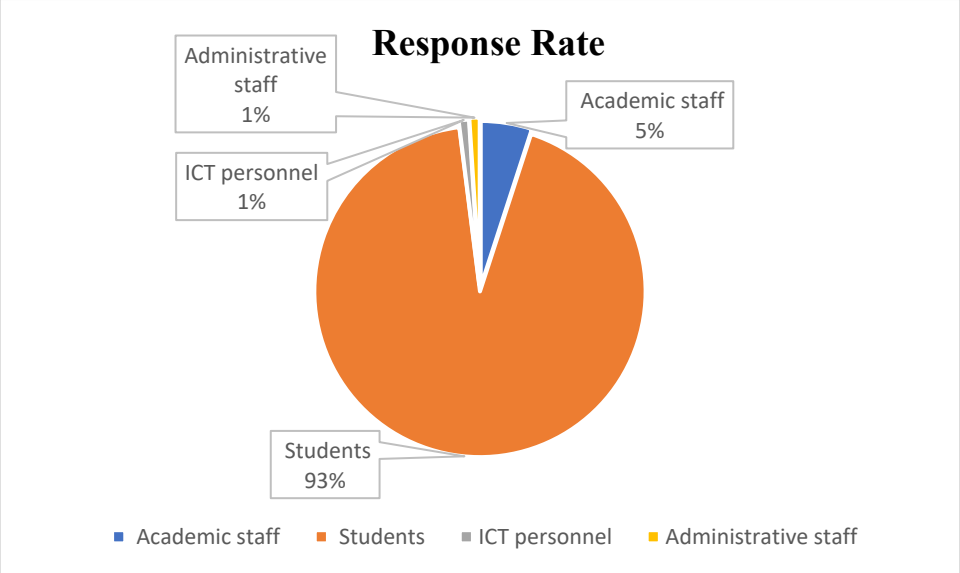
### 4.1.1 Response rate

The project set out with a sample size of 285 respondents. Of the 285 interview guides which were developed for the 262 students, 14 academic staff, 5 administrative staff and 4 ICT personnel, the project achieved 270 interviews, hence resulting in a total response rate of 94%. The variation in response was due to concerns about the confidentiality of their responses and the unavailability of some of the respondents, especially the staff as they were on holiday, and some students who were also away because of the semester break. Despite the fact that a percentage of the targeted respondents did not participate in the study, the non-response rate of 6% was relatively low and therefore unlikely to significantly affect the validity of the findings. However, to minimize the potential effects of non-response bias, findings obtained from questionnaires were cross-checked with interviews, observations, and document review.

Table 4: Shows the percentage response rate

| **Type of respondents** | **Number of responses gained** | **%Response Rate** |
|---|---|---|
| Academic staff | 13 | 5.00 |
| Students | 252 | 93.00 |
| ICT personnel | 2 | 1.00 |
| Administrative staff | 3 | 1.00 |
| Total | 270 | 100.00 |

Figure 2: Shows the percentage response rate

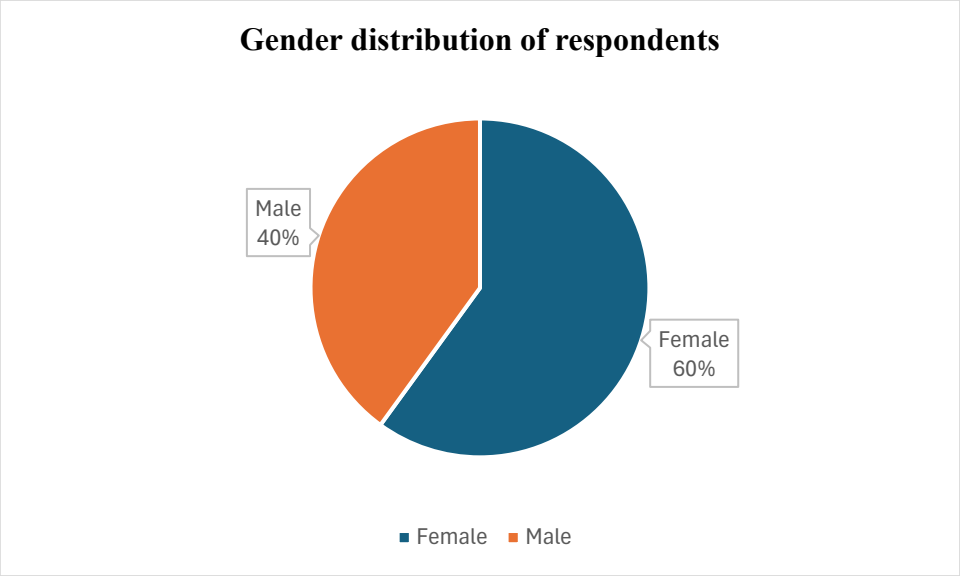



Source: Primary data, 2026

### 4.1.2 Gender of respondents

Majorly, 60% of the respondents were female and 40% were male therefore, the female gender constituted the biggest population.

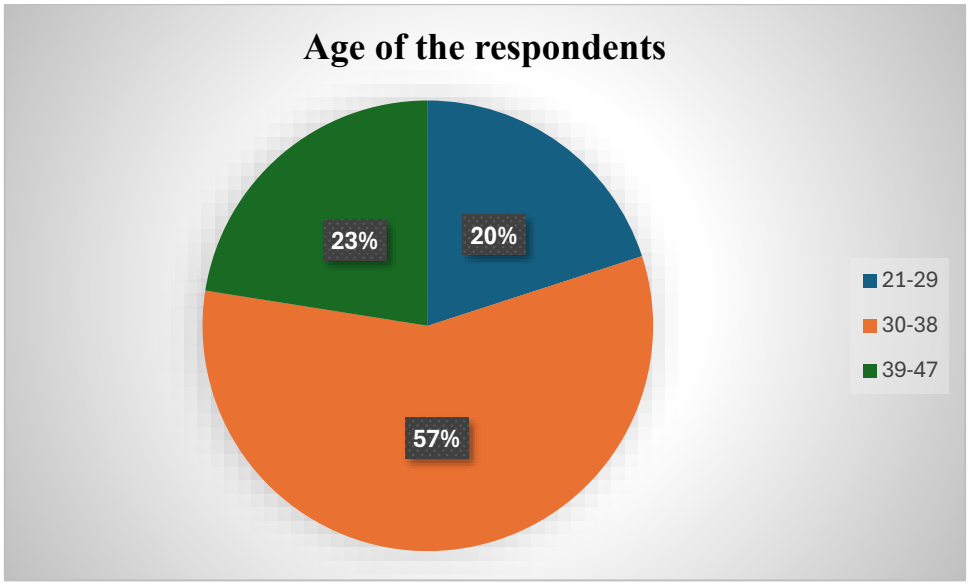
Figure 3: Shows the gender distribution




Source: Primary data, 2026

### 4.1.3. Age of the respondents

Figure 4: Shows the age range of the respondents




Source: Primary data, 2026

The results above show the age of the respondents with the age group of (30-38) having the highest number of respondents at 57% followed by the age groups of (39-47) with 23% and lastly the age group of (21-29) with the lowest number of respondents at 20%.

### 4.2. Existing internship opportunities management practices at EASLIS

To achieve this objective, requirement elicitation was conducted among key stakeholder groups, namely students, academic staff, administrative staff, and ICT personnel. The data collection process was organized through structured interviews, guided discussions, and limited document review.

The requirement elicitation process was organized in phases. In the first phase, appointment schedules were arranged with faculty coordinators and administrative offices to identify available respondents. Students were reached through class representatives and departmental WhatsApp groups, who assisted in mobilizing participants across different study years. Academic staff and coordinators were interviewed in their offices at scheduled times, while ICT and administrative staff were engaged through formal appointments arranged via the school administration office. The interviews were conducted using semi-structured guides to allow respondents to freely describe their experiences while ensuring consistency in data

collection. In addition, document review was undertaken to examine existing internship notice boards, manual records, and communication templates used by the school.

Table 5: Summarizes the existing internship opportunities management practices at the school

| Existing Practice | Supporting Literature |
|---|---|
| Use of notice boards for internship announcements | Nakaziba and Ngulube (2024) found that many higher education institutions in Uganda continue to rely on manual and semi-digital information dissemination approaches despite ongoing digital transformation initiatives. |
| Dissemination of internship information through emails and departmental announcements | OECD (2023) notes that centralized communication systems improve consistency, coordination, and institutional effectiveness by reducing fragmented communication channels. |
| Physical visits to departmental offices for internship inquiries | Al-Fraihat et al. (2023) reported that integrated information systems improve organizational performance by providing self-service access to institutional information, thereby reducing dependence on physical interactions. |
| Use of informal communication through class representatives and peers | Nakaziba and Ngulube (2024) observed that informal communication continues to complement official information dissemination mechanisms in institutions that have not fully implemented integrated digital information systems. |
| Absence of a centralized internship information platform | EDUCAUSE (2024) reports that centralized digital platforms enhance institutional efficiency by integrating services into a single environment, improving information sharing, workflow management, and user experience. |

Source: Primary Data, 2026

It was established that internship opportunities at EASLIS are currently managed through largely manual and semi-digital methods. These include notice board postings, departmental announcements, email circulation, informal communication through class representatives, and physical visits to administrative offices for inquiries. The study further established that these methods have been maintained over time because they are familiar to both staff and students and require minimal technical infrastructure.

Students reported that internship information is mainly accessed through notice boards and peer communication. One student noted during interviews:

> "Most of the time we check the notice board or ask classmates because that is where internship updates are usually posted. If you miss it, you can easily miss important opportunities."

The finding agrees with Nakaziba, S. and Ngulube, P. (2024), who established that many university information services in Uganda continue to rely on fragmented manual and semi-digital approaches despite ongoing digital transformation initiatives.

The implication is that reliance on manual communication methods limits equal access to internship opportunities because students who are away from campus or fail to regularly check notice boards are likely to miss important internship announcements.

Similarly, an academic staff member explained:

> "We usually inform students through notice boards and sometimes email, but many students still prefer checking physical announcements because not everyone regularly checks their emails."

Similarly, OECD (2023) argues that centralized communication systems improve consistency, coordination, and institutional effectiveness by eliminating duplication and conflicting messages.

The implication is that multiple disconnected communication channels reduce consistency and reliability in internship information dissemination.

The project findings indicated that departmental offices also play a central role in disseminating internship information. Students are often required to physically visit lecturers or internship coordinators to inquire about available opportunities or confirmation letters. An internship coordinator stated:

> "Students frequently come to the office asking about available placements or verification letters. We respond individually because there is no centralized platform where all this information is posted."

Likewise, Al-Fraihat, D. et al. (2023) observed that information systems improve organizational performance by providing self-service access to institutional information, thereby reducing dependence on physical interactions between staff and service users.

The implication is that dependence on physical office visits increases administrative workload while inconveniencing students who must spend additional time and resources seeking internship information.

ICT personnel further indicated that while some communication is done through email and informal digital channels, there is no structured or centralized system dedicated specifically to internship opportunities management. One ICT respondent observed:

> "At the moment, internship information is scattered across emails, notice boards, and personal contacts. A centralized system would make it easier for students to access everything in one place."

Administrative staff also acknowledged that manual communication methods remain dominant, although they present challenges in tracking and updating internship opportunities consistently.

Similarly, Educause (2024) reports that centralized digital platforms have become an essential component of higher education administration because they integrate institutional services into one environment, enabling efficient information sharing, streamlined workflows, and improved user experience

The implication of this finding is that the absence of a centralized internship information system limits effective coordination, transparency, and accessibility of internship information.

### 4.3 Challenges of the Existing Internship Opportunities Management Practices at EASLIS

Limitations associated with the current internship opportunities management practices were established as follows:

Table 6: Shows the challenges associated with the existing opportunities management practices at the school

| Challenge | Supporting Literature |
|---|---|
| Limited accessibility and delayed dissemination of internship information | The World Bank (2023) reports that centralized digital platforms improve communication by providing timely and equitable access to institutional information, thereby increasing student participation in academic and career-related activities. |
| Fragmented communication channels | OECD (2023) emphasizes that integrated communication systems improve consistency, eliminate duplication, and ensure synchronized dissemination of institutional information. |
| High administrative workload | UNESCO (2023) notes that digital information systems automate routine administrative functions, reducing repetitive tasks and improving staff productivity. |
| Absence of a centralized internship management system | UNESCO (2023) states that centralized educational platforms improve operational transparency and coordination through a single, reliable information repository. Al-Fraihat et al. (2023) further report that integrated information systems enhance institutional efficiency through centralized data management and automated workflows. |
| Inefficient tracking and monitoring of internship opportunities and placements | Nakaziba and Ngulube (2024) found that centralized digital information systems improve institutional information management by facilitating efficient storage, retrieval, monitoring, and reporting of organizational information. |

Source: Primary Data, 2026

#### 4.3.1 Limited Accessibility and Delayed Information Dissemination

The project established that access to internship opportunities is often delayed due to reliance on physical notice boards and manual communication channels. Students must regularly check notice boards or wait for peer updates, which sometimes results in missed deadlines.

One student reported:

> "Sometimes opportunities are posted and removed quickly, and if you are not around the notice board at the right time, you miss them."

Similarly, World Bank (2023) reports that centralized digital platforms significantly improve communication between universities and students by providing instant access to institutional announcements and opportunities. The report further notes that delayed dissemination of

academic information negatively affects students' participation in institutional activities, including internships and career development programmes.

The implication of these findings is that delayed dissemination of internship information reduces students' chances of securing quality internship placements.

### 4.3.2 Fragmented Communication Channels

Internship information is disseminated through multiple uncoordinated channels, including notice boards, emails, WhatsApp groups, and departmental announcements. This fragmentation leads to inconsistencies in the information received by students.

An academic staff member explained:

> "We sometimes send internship information through email and also put it on notice boards, but not all students receive it at the same time, which creates confusion."

According to OECD (2023), higher education institutions require integrated communication systems to ensure that all students receive consistent and synchronized information. Fragmented communication channels often lead to duplication of information, inconsistent messaging, and confusion among users.

The implication is that fragmented communication reduces information consistency and increases the likelihood that students receive incomplete, outdated and conflicting internship information. This affects institutional transparency, creates unnecessary confusion, and may discourage student participation in internship programmes.

### 4.3.3 High Administrative Workload

It was established that academic and administrative staff spend considerable time responding to individual student inquiries regarding internship opportunities. This includes repeated explanations, manual verification of information, and physical guidance.

An internship coordinator noted:

> "We receive many students every day asking about internships, and we have to repeat the same information over and over again."

According to UNESCO (2023), digital information systems automate routine administrative activities, allowing academic staff to focus on teaching, supervision, and student support rather than repetitive administrative tasks.

The implication is that excessive administrative workload reduces staff productivity and diverts valuable time away from teaching, research, supervision, and academic planning.

### 4.3.4 Lack of Centralized Internship Management System

There is no integrated system for managing internship opportunities, applications, and placements at EASLIS. As a result, information is stored in different formats and locations, making coordination difficult.

An ICT personnel member explained:

> "We do not have a centralized platform where internship opportunities are uploaded, tracked, and accessed by all students."

Similarly, UNESCO (2023) reports that centralized educational platforms improve operational transparency by ensuring that all stakeholders access updated information from one reliable database.

Supporting these findings, Al-Fraihat et al. (2023) found that integrated information systems significantly improve institutional efficiency through centralized storage, automated workflows, and improved coordination among users.

The implication is that the absence of a centralized internship management platform creates inefficiencies in information sharing, increases duplication of work, and weakens institutional coordination.

### 4.3.5 Inefficient Tracking and Monitoring of Internship Opportunities

Challenges were identified in tracking available internship placements, student applications, and placement status. Since records are manually maintained or scattered across emails, monitoring becomes difficult for both staff and students.

An administrative staff member stated:

> "It is not easy to track which students have applied where unless we manually go through records."

Supporting these findings, Nakaziba, S. and Ngulube, P. (2024) found that digital transformation initiatives in Ugandan university libraries improve information management through centralized digital platforms that facilitate efficient storage, retrieval, monitoring, and sharing of institutional information.

The implication is that poor tracking and monitoring reduce the institution's ability to evaluate internship participation, monitor placement progress, and generate reliable management reports. This leads to poor planning, inefficient allocation of internship opportunities, and reduced institutional accountability.

### 4.4 Solutions to the Challenges of the Current Internship Opportunities Management Practices at EASLIS

The requirement elicitation process for this objective was organized in structured phases. Initially, appointments were coordinated with departmental heads and the school administration to identify relevant respondents. Students were mobilized through class representatives and departmental communication groups to ensure representation across different academic levels. Academic staff and internship coordinators were engaged through scheduled office-based interviews, while administrative and ICT personnel participated through formal appointments arranged by the school administration. The interviews were guided by semi-structured questions focusing on the challenges identified in the previous section and possible system-based solutions. In addition, document review was conducted on existing internship communication records, notice board announcements, and departmental internship guidelines to support triangulation of findings.

Table 7: Summary of Solutions to the Challenges of the Current Internship Opportunities Management Practices at EASLIS

| Recommended Solution | Supporting Literature |
|---|---|
| Development of a Centralized Internship Opportunities Information System | Patel and Singh (2026) found that centralized internship platforms improve access to internship opportunities, enhance coordination, and reduce fragmented information. Similarly, Pacaldo et al. (2025) reported that centralized internship management systems strengthen communication, coordination, and institutional information management. |
| Integration of Real-Time Notification and Alert Systems | Hamam et al. (2025) observed that real-time notification mechanisms improve communication efficiency, reduce delays in information dissemination, and enhance user responsiveness within digital information systems. |
| Digitization of Internship Application and Approval Processes | Apriyanti et al. (2025) found that web-based internship management systems improve application processing efficiency, reduce manual paperwork, enhance transparency, and simplify application tracking. |
| Improved Data Management and | Pacaldo et al. (2025) reported that centralized databases improve institutional record management and operational efficiency. Similarly, Casugay et al. (2024) found that digital |

| | |
|---|---|
| Centralized Record Storage | record management enhances data accuracy, accessibility, transparency, and information retrieval. |
| Reduction of Administrative Workload through Self-Service Access | Apriyanti et al. (2025) observed that self-service digital platforms reduce repetitive administrative tasks, improve institutional efficiency, and enhance service delivery by enabling users to independently access required information. |
| Standardization and Streamlining of Internship Communication Channels | Pacaldo et al. (2025) found that centralized communication platforms improve consistency in information dissemination, eliminate fragmented communication channels, and strengthen collaboration among institutional stakeholders. |

Source: Primary Data, 2026

### 4.4.1 Development of a Centralized Internship Opportunities Information System

The project established that the most effective solution to the existing challenges is the development of a centralized Internship Opportunities Information System that consolidates all internship-related information into a single platform. This system would allow students to view available opportunities, submit applications, and track placement status in real time.

Students strongly supported this idea. One student noted:

"If there was one system where all internship opportunities are posted, it would save us a lot of time instead of checking notice boards and asking around."

Similarly, ICT personnel emphasized:

> "A centralized system would eliminate scattered communication and ensure that all students access the same updated information at the same time."

This finding agrees with Patel and Singh (2026), who found that centralized internship platforms improve access to opportunities and reduce fragmented information. Similarly, Pacaldo et al. (2025) reported that centralized internship systems enhance communication, coordination, and information management.

The implication is that implementing a centralized Internship Opportunities Information System would provide a single access point for internship information, improve coordination, and ensure students receive accurate and timely internship opportunities.

### 4.4.2 Integration of Real-Time Notification and Alert Systems

The study established that delayed information dissemination is a major challenge under the current system. As a solution, respondents recommended the integration of real-time

notification mechanisms such as email alerts, SMS notifications, or in-system notifications within the developed platform.

An academic staff member explained:

> "Students should be notified immediately when new internship opportunities are posted instead of relying on notice boards."

This finding is consistent with Hamam et al. (2025), who observed that real-time notifications improve timely communication and ensure students do not miss internship opportunities. The study further noted that automated alerts enhance user experience and reduce communication delays.

The implication is that integrating real-time notifications into the Internship Opportunities Information System would ensure timely dissemination of internship announcements, reduce missed opportunities, and improve student responsiveness.

### 4.4.3 Digitization of Application and Approval Processes

The project identified that manual submission and approval of internship applications contributes to delays and inefficiencies. As a solution, respondents recommended the digitization of the entire application workflow, including online submission, verification, and approval by coordinators.

An internship coordinator stated:

> "If students could submit applications online and we approve them electronically, it would reduce the long queues and paperwork we deal with."

This finding agrees with Apriyanti et al. (2025), who found that web-based internship application systems reduce manual paperwork, improve processing efficiency, and enhance transparency through online application tracking.

The implication is that digitizing internship application and approval processes would minimize paperwork, reduce processing delays, improve transparency, and simplify application management for both students and administrators.

### 4.4.4 Improved Data Management and Centralized Record Storage

It was established that fragmented records and manual storage systems create challenges in tracking internship placements and student progress. As a solution, respondents recommended a centralized database system for storing all internship-related records.

An administrative staff member observed:

> "Having all internship records in one system would make it easier to track who has applied, been placed, or completed their internship."

This finding is supported by Pacaldo et al. (2025), who reported that centralized databases improve record management and operational efficiency. Similarly, Casugay et al. (2024) observed that digital record management enhances data accuracy, transparency, and accessibility.

The implication is that centralized digital record storage would improve data accuracy, simplify information retrieval, reduce data duplication, and strengthen the management of internship records.

### 4.4.5 Reduction of Administrative Workload through Self-Service Access

The study established that staff experience high workloads due to repeated student inquiries. As a solution, respondents proposed a self-service feature within the system where students can independently access internship information without constant staff intervention.

An ICT respondent noted:

> "If students can log into a system and find everything they need, staff will spend less time answering repeated questions."

Similarly, an academic staff member added:

> "A self-service system would allow us to focus more on supervision rather than repeating the same information to students."

This finding agrees with Apriyanti et al. (2025), who noted that digital systems reduce staff workload by automating routine administrative activities and allowing users to access information independently.

The implication is that providing self-service access through the Internship Opportunities Information System would reduce repetitive administrative tasks, improve operational efficiency, and allow staff to focus on more strategic responsibilities.

### 4.4.6 Standardization and Streamlining of Internship Communication Channels

The project findings established that fragmented communication contributes to inconsistencies in information delivery. As a solution, respondents recommended the standardization of all internship communication through a single official platform.

A student explained:

> "Sometimes we get different information from WhatsApp groups and notice boards, which is confusing. One official system would solve this."

This finding is consistent with Pacaldo et al. (2025), who found that centralized communication platforms eliminate fragmented communication and improve consistency in information sharing among stakeholders.

The implication is that standardizing internship communication through a centralized system would improve consistency, reduce communication gaps, and ensure all students receive accurate and timely internship information from a single official source.

## 4.4 Requirements necessary for an internship opportunities information System for EASLIS

The requirements for the developed Internship Opportunities Information System were identified through a systematic requirements elicitation process involving key stakeholders of EASLIS. The study targeted students, internship coordinators, academic supervisors, host organizations, and administrative staff who participate in internship placement, supervision, monitoring, and reporting activities.

Data were collected using questionnaires, interviews, observations, and document review to obtain comprehensive information regarding the existing internship management practices and stakeholders' expectations for the developed system. Students provided information regarding challenges encountered while searching for internship opportunities, submitting applications, receiving placement feedback, and submitting internship reports. Internship coordinators explained the difficulties associated with managing internship vacancies, student placements, and communication with host organizations. Academic supervisors provided information

concerning supervision, monitoring, assessment, and report management, while representatives from host organizations explained the challenges encountered when advertising internship opportunities and managing student applications.

Based on the project findings, the requirements necessary for developing the Internship Opportunities Information System were identified and categorized into functional requirements, non-functional requirements, software requirements, hardware requirements, and security requirements.

### 4.4.1 Functional Requirements

The functional requirements describe the specific services, processes, and activities that the Internship Opportunities Information System should perform to support internship opportunity management, placement coordination, supervision, and reporting within EASLIS.

Table 8: Functional Requirements for the Developed System

| Functional Requirement | Stakeholder Rationale |
|---|---|
| User registration and authentication | Enables students, coordinators, supervisors, and organizations to securely access the system according to their roles. |
| Internship opportunity management | Allows organizations and coordinators to create, update, and manage internship vacancies. |
| Student profile management | Enables students to maintain personal, academic, and internship-related information. |
| Internship application management | Allows students to apply for internship opportunities electronically and track application status. |
| Organization management | Enables registration and management of organizations offering internship opportunities. |
| Internship placement management | Facilitates allocation and monitoring of students placed in organizations. |
| Supervisor management | Allows assignment and management of academic supervisors responsible for internship monitoring. |
| Internship logbook management | Enables students to submit internship activities and progress records electronically. |

| | |
|---|---|
| Internship report submission | Allows students to upload final internship reports for assessment and record keeping. |
| Notifications and communication | Enables automatic communication between students, coordinators, supervisors, and organizations. |
| Search and retrieval functionality | Facilitates quick searching and retrieval of internship opportunities, applications, reports, and placement records. |
| Reporting and analytics | Supports generation of internship statistics, placement reports, application summaries, and supervisory reports. |

Source: Primary Data, 2026

### 4.4.2 Non-Functional Requirements

The non-functional requirements describe the quality attributes and operational characteristics that the developed Internship Opportunities Information System should possess to ensure effective performance, usability, security, and reliability.

Table 9**:** Non-Functional Requirements for the Developed System

| **Non-Functional Requirement** | **Stakeholder Rationale** |
|---|---|
| User-friendly interface | Ensures users can easily navigate and use the system with minimal training. |
| Security | Protects internship records, reports, applications, and user information from unauthorized access. |
| Reliability | Ensures continuous availability of the system and consistent operation. |
| Performance | Enables fast loading, processing, and retrieval of information. |
| Scalability | Allows the system to accommodate increasing numbers of students, organizations, and internship records. |
| Maintainability | Facilitates future system updates, modifications, and troubleshooting. |
| Availability | Ensures users can access the system whenever required. |
| Data integrity | Maintains accuracy and consistency of internship information and records. |

| | |
|---|---|
| Compatibility | Enables operation across different browsers and computing devices. |
| Auditability | Supports tracking of system activities and user actions for accountability purposes. |

Source: Primary Data, 2026

### 4.4.3 System Requirements

The project identified several software and hardware requirements necessary for the successful development, deployment, and operation of the Internship Opportunities Information System. These requirements were established based on the technologies used in the system architecture and the operational needs of EASLIS stakeholders.

Table 10: Shows the Software Requirements

| Software | Specification | Justification |
|---|---|---|
| Operating System | Windows 10, Windows 11, Linux Ubuntu Server | Provides a stable environment for system development, testing, hosting, and deployment. |
| Programming Languages | PHP, JavaScript, HTML5, CSS3 | Support development of dynamic, responsive, and interactive web-based applications. |
| Database Management System | MySQL Server 5.7 | Provides secure storage and management of students, internships, applications, placements, reports, and notifications. |
| Web Server | Apache Server | Enables hosting and execution of the web-based application. |
| Development Environment | Visual Studio Code or similar IDE | Supports coding, debugging, testing, and maintenance of the system. |
| Local Hosting Environment | Wampserver | Provides Apache, PHP, and MySQL integration during development and testing. |
| Web Browser | Google Chrome, Mozilla Firefox, Microsoft Edge | Enables users to access and interact with the system. |
| Email Service Integration | SMTP Mail Service | Supports automated notifications and communication among stakeholders. |

Source: Primary Data, 2026

### 4.4.4 Hardware Requirements

Table 11: Hardware Requirements

| Hardware | Specification | Justification |
|---|---|---|
| Processor | Intel Core i3 (2.5 GHz) or higher | Provides adequate processing power for database operations, report generation, and user transactions. |
| RAM | 8 GB or higher | Supports simultaneous execution of the web server, database server, and browser applications. |
| Storage | 500 GB HDD or 256 GB SSD and above | Provides sufficient space for internship opportunities, applications, reports, logbooks, notifications, and backup files. |
| Network Connectivity | Reliable Internet Connection | Supports online access by students, supervisors, coordinators, and organizations. |

Source: Primary Data, 2026

## 4.5 Developing a web-based Internship Opportunities Information System for EASLIS

Following the identification and analysis of user and system requirements, the third objective of the study was to develop a web-based Internship Opportunities Information System for the EASLIS, Makerere University. Based on the project findings, the developed system was intended to address challenges associated with limited access to internship information, fragmented communication between stakeholders, difficulties in internship opportunity dissemination, and inefficiencies in managing internship-related records.

Interviews conducted with students, internship coordinators, and administrative staff established the need for a centralized platform through which internship opportunities could be published, searched, managed, and monitored. One internship coordinator explained that:

### 4.5.1 System Design

The system was designed using a modular web-based architecture to promote maintainability, scalability, usability, and future expansion. The design process involved the development of system workflows, database structures, user interfaces, and functional specifications that guided system implementation.

The architecture adopted for the system consisted of three major layers:

**Presentation Layer**

This layer provides the user interfaces through which students, employers, internship coordinators, and system administrators interact with the system. It facilitates access to

internship opportunities, application services, communication tools, and administrative functions.

**Application Layer**

The application layer processes user requests, executes business logic, validates user inputs, manages workflow processes, and controls access to system functionalities based on user roles.

**Database Layer**

The database layer stores and manages internship opportunities, student profiles, employer records, internship applications, notifications, reports, and user account information.

The three-tier architecture was selected because it supports centralized management of internship information while enabling efficient interaction among multiple stakeholder groups.

### 4.5.2 Database Design

A centralized relational database was designed to support storage, retrieval, and management of internship-related information. The database was implemented using MySQL and consisted of interconnected tables designed to promote data integrity, consistency, and efficient information retrieval.

Relationships among these entities were established through primary and foreign keys to ensure consistency and eliminate unnecessary data duplication.

The database structure enables authorized users to access current internship information while supporting secure management of records across different user categories.

### 4.5.3 System Development Approach

The development of the Internship Opportunities Information System followed an Agile development approach. This approach enabled incremental development of system functionalities while allowing continuous consultation with intended users throughout the development process.

The project established that user requirements evolved during system design as stakeholders gained a clearer understanding of the developed solution. Consequently, iterative development cycles were used to incorporate stakeholder feedback and refine system functionalities.

Regular consultations were conducted with students, internship coordinators, and administrative personnel to ensure that the developed system aligned with institutional requirements and operational procedures.

The Agile approach facilitated flexibility during development and contributed to the creation of a system that addressed identified internship management challenges.

### 4.5.4 User Interface Design

The system interfaces were designed with emphasis on simplicity, accessibility, consistency, and ease of navigation. Findings from stakeholder consultations established that users possessed varying levels of computer literacy; therefore, user-friendliness was prioritized during interface design.

In response to these expectations, the system interfaces were developed with clear navigation menus, organized forms, responsive layouts, and intuitive workflows.

The dashboard serves as the primary entry point to the system and provides quick access to major functionalities including internship opportunity management, internship searches, applications, notifications, reporting, and administrative services.

Input validation mechanisms were incorporated throughout the system to minimize data entry errors, improve data quality, and enhance overall system reliability.

# CHAPTER FIVE: AN INTERNSHIP OPPORTUNITIES INFORMATION SYSTEM FOR EASLIS MAKERERE UNIVERSITY

## 5.0 Introduction

This chapter presents the system design, system development in terms of the tools, technologies that were used throughout the development process as well as the process that was followed to test the system and finally system implementation through the use of system forms and screenshots.

## 5.1 System Design

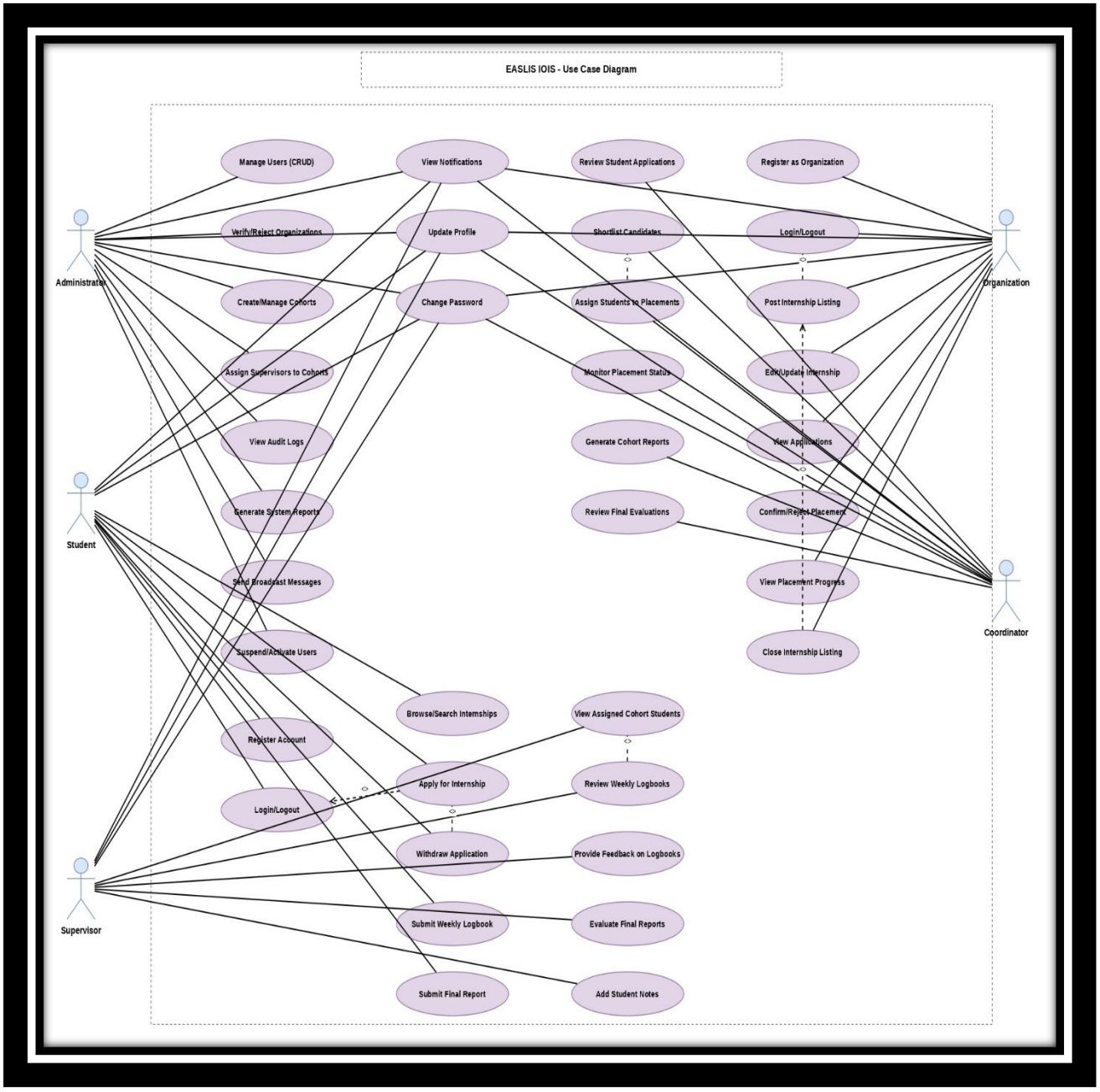
The system was designed through the analysis and modelling of the key processes, data structures, and interactions required to support the effective management of internship opportunities for EASLIS students at Makerere University.

During the design phase, various system models and diagrams were developed to illustrate the architecture, data flow, database structure, and user interactions within the Internship Opportunities Information System. These design artifacts provided a clear framework for organizing system components and ensuring efficient system functionality.

### 5.1.1 Use Case Diagram

A System Use Case Diagram is a Unified Modeling Language diagram that illustrates the functional requirements of a system by showing the interactions between external users and the services or functions provided by the system (Dennis, Wixom, & Tegarden, 2021). It provides a high-level view of system functionality and identifies how different users interact with the system.

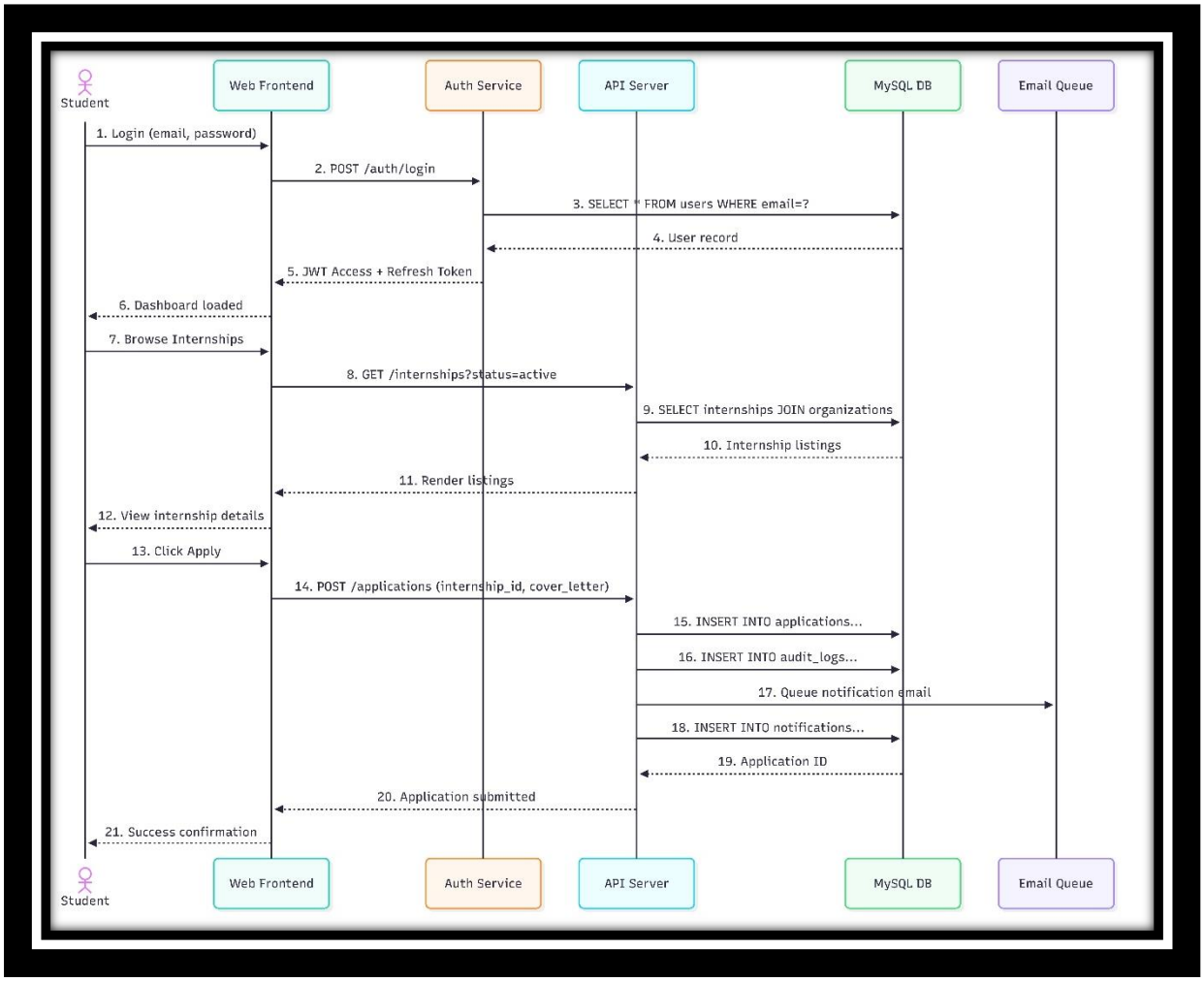
Figure 5: Shows the system Use Case diagram



### 5.1.2 Sequence diagram

A System Sequence Diagram is a Unified Modeling Language behavioral diagram that illustrates the chronological order in which messages are exchanged between system users and the system to accomplish a particular task (Dennis et al., 2021).

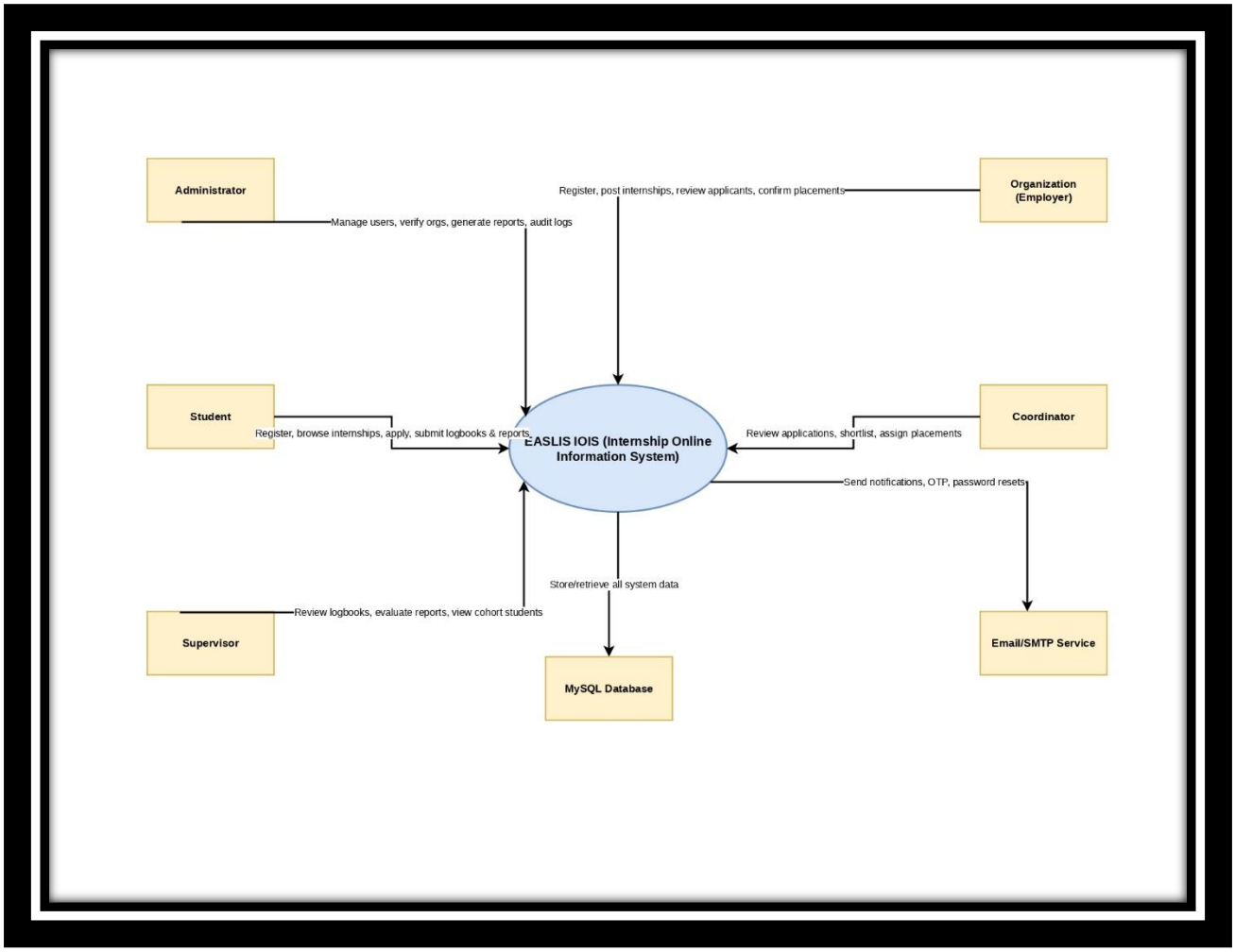
Figure 6: Shows the system sequence diagram



### 5.1.3 Context diagram

A System Context Diagram is a high-level data flow diagram that illustrates the boundary of a system and shows how it interacts with external entities through the exchange of information.

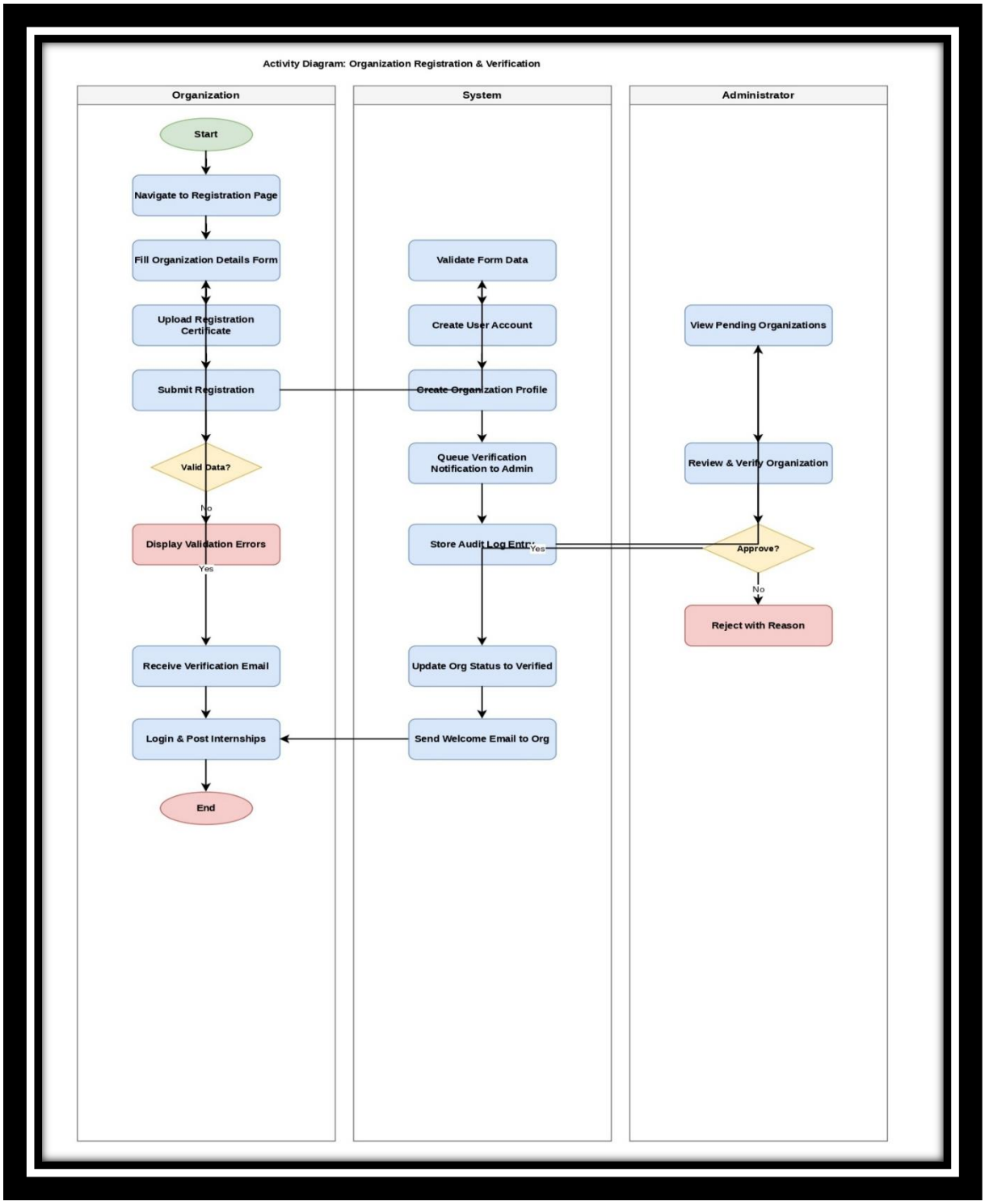
Figure 7: Shows the system context diagram



### 5.1.4 Activity diagram

A System Activity Diagram is a Unified Modeling Language behavioral model that represents the workflow of activities performed within a system from the beginning of a process to its completion. It illustrates the sequence of actions, decisions, and parallel activities involved in executing system functions.

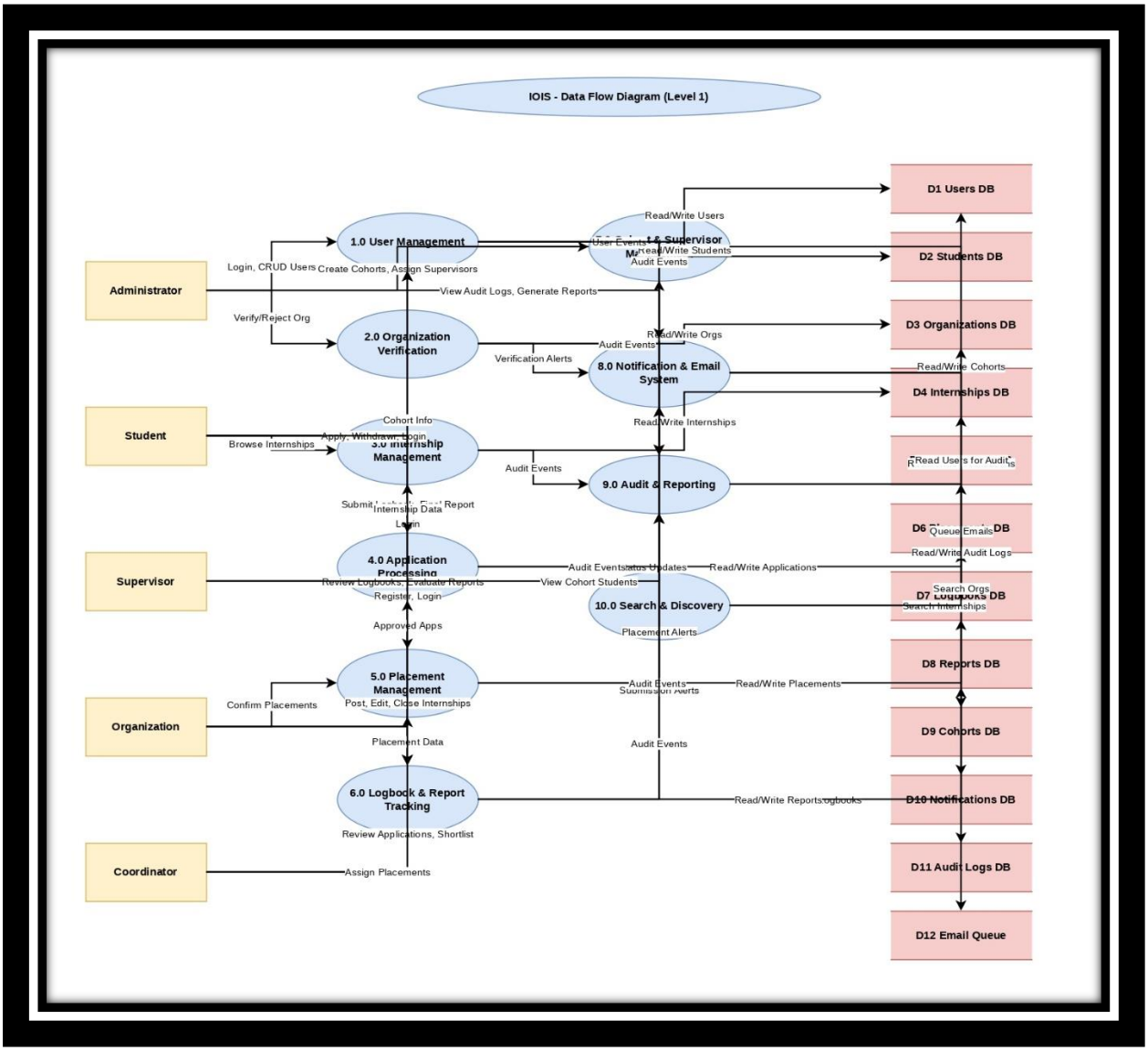
Figure 8: Shows the system activity diagram



### 5.1.5 Process Modelling Using the Data Flow-Level 1 Diagram

A Data Flow Diagram (DFD) is a graphical technique used to model the flow of data through an information system by depicting the processes that transform data, the data stores where information is maintained, the external entities interacting with the system, and the movement of data between these components.

Figure 9: Shows the system Data flow diagram Level 1



#### 5.1.5.1 External Entities

The system interacts with five primary external entities, which either provide information to the system or receive processed information from it. Namely;

*1. Administrator*

The Administrator is responsible for overall system administration and control. The administrator manages user accounts, verifies organizations, creates cohorts, assigns supervisors, monitors system activities, and generates reports. The system provides authentication responses, reports, notifications, and audit information to support administrative decision-making.

*2. Coordinator*

The coordinator manages internship administration at the academic level. Responsibilities include reviewing applications, assigning placements, monitoring student progress, and coordinating internship activities across cohorts. The system provides placement information, reports, and monitoring tools to support coordination functions.

*3. Organization*

Organizations provide internship opportunities for students. They register with the system, submit organization details for verification, post internship vacancies, and confirm student placements. The system provides registration feedback, verification status, placement information, and communication alerts.

*4. Supervisor*

Supervisors oversee students during internship placement. They review applications, monitor student progress, assess logbooks, evaluate final reports, and provide performance feedback. The system supplies placement information, student records, and evaluation tools to facilitate supervision activities.

*5. Student*

Students are the primary beneficiaries of the system. They browse available internship opportunities, submit applications, upload required documents, maintain internship logbooks, and submit final internship reports. The system provides internship listings, application feedback, placement information, and notifications to students.

### 5.1.5.2 Core System Processes

The Internship Opportunities Information System consists of several major processes:

*1.0 User Management*

This process manages user registration, authentication, role assignment, cohort creation, and supervisor allocation. It ensures that only authorized users can access the system according to their assigned roles.

*2.0 Organization Verification*

This process handles registration and verification of organizations before they are allowed to advertise internship opportunities. Verification helps ensure the credibility and authenticity of internship providers.

*3.0 Internship Management*

This process manages internship opportunities posted by organizations. Students can browse available opportunities, search internships, and view internship requirements.

*4.0 Application Processing*

The application processing module receives student applications, stores application records, and supports review and approval workflows by coordinators and supervisors.

*5.0 Placement Management*

This process manages internship placement allocation and confirmation. It links successful applicants with approved internship organizations and maintains placement records.

*6.0 Logbook and Report Tracking*

The system tracks weekly student internship activities through logbooks and manages final internship report submissions and evaluations.

*8.0 Notification and Email System*

This module generates notifications and email alerts for registration approvals, application updates, placement confirmations, and other system events.

*9.0 Audit and Reporting*

This process records user activities and system transactions while generating administrative and management reports.

*10.0 Search and Discovery*

This module enables users to search internship opportunities, organizations, students, placements, and internship-related information.

**5.1.5.3 Data Stores**

The system utilizes twelve data stores that support internship information management.

D1 – Users Database

Stores user accounts, login credentials, access permissions, and role information.

D2 – Students Database

Stores student profiles, registration numbers, specialization details, cohort information, and uploaded CVs.

D3 – Organizations Database

Stores organization profiles, registration details, contact information, and verification status.

D4 – Internships Database

Stores internship opportunities, requirements, locations, deadlines, and vacancy information.

D5 – Applications Database

Stores internship application records, application status, cover letters, and supporting documents.

D6 – Supervisors Database

Stores supervisor profiles and supervision assignments.

D7 – Logbooks Database

Stores weekly internship logbook submissions and supervisor feedback.

D8 – Reports Database

Stores final internship reports, evaluations, and performance assessments.

D9 – Cohorts Database

Stores cohort information, specialization categories, academic year records, and internship periods.

D10 – Notifications Database

Stores user notifications and communication alerts.

D11 – Audit Logs Database

Stores audit trails, user activities, system actions, and accountability records.

D12 – Email Queue

Stores email messages awaiting processing and delivery.

#### 5.1.5.4 Data Flow Description

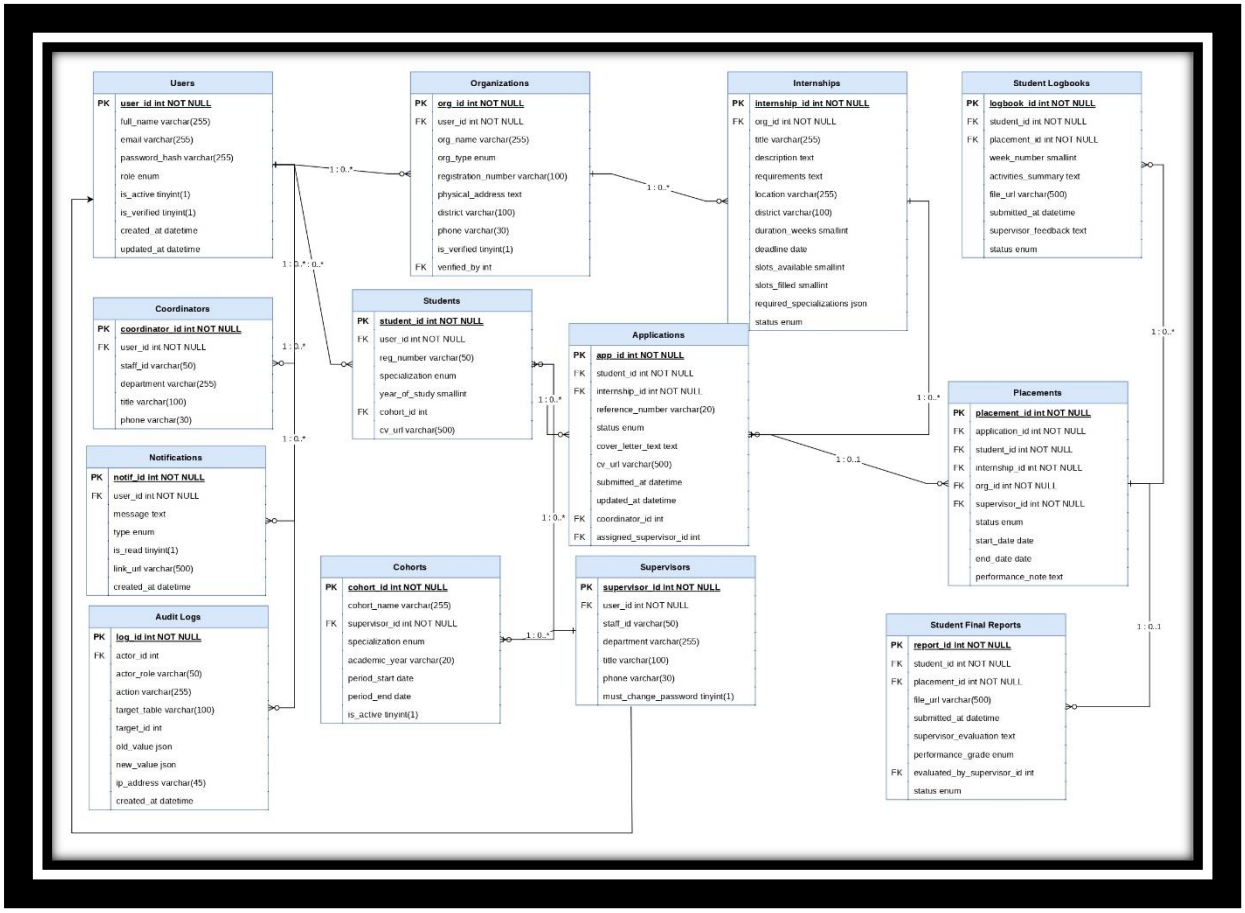
The Internship Opportunities Information System receives organization registration data, internship opportunities, student applications, placement information, logbook submissions, and evaluation reports from various stakeholders. The system processes this information according to predefined business rules and stores it in the appropriate databases.

When users request information, the system retrieves relevant records from the data stores and generates outputs such as internship listings, application status updates, placement notifications, supervision reports, internship evaluations, and management reports. The interaction between external entities, system processes, and data stores ensures efficient management of internship opportunities and student placements within EASLIS.

### 5.1.6 Entity Relationship Diagram

An Entity Relationship Diagram (ERD) is a graphical model that illustrates the logical structure of a database by identifying the entities within a system, their attributes, and the relationships between them. It is used to design and organize data in a way that supports efficient storage, retrieval, and maintenance while minimizing redundancy and ensuring data integrity (Elmasri & Navathe, 2021; Coronel & Morris, 2023).

Figure 10: Shows the system entity relationship Diagram




### 5.1.6.1 Key Entities and Relationships

The Users entity serves as the central table from which different categories of system users are managed, including Administrators, Students, Supervisors, Coordinators, and Organization representatives. User authentication, authorization, and account management are handled through this entity.

Key relationships within the system include:

One Organization can post many Internship Opportunities, while each internship opportunity belongs to one organization.

One Student can submit multiple Applications, while each application is associated with one internship opportunity.

One Internship Opportunity can receive multiple applications from different students.

One approved Application results in one Placement, linking a student to an internship organization.

One Supervisor can supervise many student placements and evaluate internship performance.

One Student can submit multiple Logbook Entries during internship training.

One Student can submit one Final Internship Report for a completed placement.

One Coordinator can manage multiple students, internship applications, and placement activities within a cohort.

One Cohort contains many students, while each student belongs to a specific cohort.

The Notifications entity manages communication between the system and users through alerts and system messages.

The Audit Logs entity records system activities and user actions for accountability, security, and monitoring purposes.

### 5.1.7 Logical Database design

The statements below define how the Entity Relationship Diagram above was implemented while creating the database system for the application. It shows the entities and their attributes as shown in the tables below;

Table 12:Shows the logical database design structure

| Table Name | Primary Key | Fields | Foreign Keys & Constraints |
|---|---|---|---|
| USERS | user_id | user_id (int, auto_increment), username (varchar(100), unique), email (varchar(255), unique), password_hash (varchar(255)), full_name (varchar(255)), role (enum('admin','student','organization','coordinator','supervisor')), profile_image_url (varchar(500)), is_active (boolean), created_at (datetime) | UNIQUE(username), UNIQUE(email), INDEX(role) |
| STUDENTS | student_id | student_id (int, auto_increment), user_id (int, not null), student_number (varchar(50), unique), programme (varchar(100)), year_of_study (int), specialization (varchar(100)), phone (varchar(30)) | FK: user_id → USERS(user_id) ON DELETE CASCADE, UNIQUE(student_number) |
| ORGANIZATIONS | organization_id | organization_id (int, auto_increment), user_id (int, not null), organization_name (varchar(255)), industry (varchar(100)), address (varchar(255)), website (varchar(255)), contact_person (varchar(255)), contact_email (varchar(255)), verification_status (enum('pending','verified','rejected')) | FK: user_id → USERS(user_id) ON DELETE CASCADE |
| COORDINATORS | coordinator_id | coordinator_id (int, auto_increment), user_id (int, not null), staff_id (varchar(50)), department (varchar(255)), title (varchar(100)), phone (varchar(30)), office_location (varchar(255)) | FK: user_id → USERS(user_id) ON DELETE CASCADE, UNIQUE(staff_id) |
| SUPERVISORS | supervisor_id | supervisor_id (int, auto_increment), user_id (int, not null), staff_id (varchar(50)), specialization (varchar(100)), phone (varchar(30)) | FK: user_id → USERS(user_id) ON DELETE CASCADE |
| COHORTS | cohort_id | cohort_id (int, auto_increment), cohort_name (varchar(255)), supervisor_id (int), specialization (enum('Library Science','Records | FK: supervisor_id → SUPERVISORS(supervisor_id), |

| | | | |
|---|---|---|---|
| | | Management','Information Management','Mixed')), academic_year (varchar(20)), period_start (date), period_end (date), is_active (boolean), created_at (datetime) | INDEX(academic_year) |
| INTERNSHIPS | internship_id | internship_id (int, auto_increment), organization_id (int, not null), title (varchar(255)), description (text), location (varchar(255)), category (varchar(100)), duration (varchar(100)), requirements (text), application_deadline (date), status (enum('open','closed','filled')), created_at (datetime) | FK: organization_id → ORGANIZATIONS(organization_id) ON DELETE CASCADE |
| APPLICATIONS | app_id | app_id (int, auto_increment), student_id (int), internship_id (int), reference_number (varchar(20)), status (enum('submitted','under_review','shortlisted','accepted','rejected','withdrawn')), cover_letter_text (text), cv_url (varchar(500)), submitted_at (datetime), updated_at (datetime), coordinator_id (int), assigned_supervisor_id (int) | FK: student_id → STUDENTS(student_id), FK: internship_id → INTERNSHIPS(internship_id), FK: coordinator_id → COORDINATORS(coordinator_id), FK: assigned_supervisor_id → SUPERVISORS(supervisor_id), UNIQUE(student_id, internship_id) |
| PLACEMENTS | placement_id | placement_id (int, auto_increment), student_id (int), organization_id (int), supervisor_id (int), internship_id (int), start_date (date), end_date (date), status (enum('ongoing','completed','terminated')) | FK: student_id → STUDENTS(student_id), FK: organization_id → ORGANIZATIONS(organization_id), FK: supervisor_id → SUPERVISORS(supervisor_id), FK: internship_id → INTERNSHIPS(internship_id) |
| STUDENT_LOGBOOKS | logbook_id | logbook_id (int, auto_increment), student_id (int), placement_id (int), activity_date (date), activities_performed (text), supervisor_comments (text), status (enum('pending','approved','rejected')), submitted_at (datetime) | FK: student_id → STUDENTS(student_id), FK: placement_id → PLACEMENTS(placement_id) |

| | | | |
|---|---|---|---|
| STUDENT_FINAL_REPORTS | report_id | report_id (int, auto_increment), student_id (int), placement_id (int), report_title (varchar(255)), report_file_url (varchar(500)), submission_date (date), status (enum('submitted','reviewed','approved')) | FK: student_id → STUDENTS(student_id), FK: placement_id → PLACEMENTS(placement_id) |
| SUPERVISOR_STUDENT_NOTES | note_id | note_id (int, auto_increment), supervisor_id (int), student_id (int), note_text (text), created_at (datetime) | FK: supervisor_id → SUPERVISORS(supervisor_id), FK: student_id → STUDENTS(student_id) |
| NOTIFICATIONS | notification_id | notification_id (int, auto_increment), user_id (int), title (varchar(255)), message (text), notification_type (varchar(100)), is_read (boolean), created_at (datetime) | FK: user_id → USERS(user_id) ON DELETE CASCADE |
| REPORTS | report_id | report_id (int, auto_increment), generated_by (int), report_type (varchar(100)), report_period (varchar(100)), generated_at (datetime), report_file_url (varchar(500)) | FK: generated_by → USERS(user_id) |
| AUDIT_LOGS | log_id | log_id (int, auto_increment), actor_id (int), actor_role (varchar(50)), action (varchar(255)), target_table (varchar(100)), target_id (int), ip_address (varchar(45)), created_at (datetime) | FK: actor_id → USERS(user_id), INDEX(created_at) |
| SEARCH_LOGS | search_id | search_id (int, auto_increment), user_id (int), search_term (varchar(255)), search_date (datetime) | FK: user_id → USERS(user_id) |
| USER_SESSIONS | session_id | session_id (int, auto_increment), user_id (int), login_time (datetime), logout_time (datetime), ip_address (varchar(45)), session_status (varchar(20)) | FK: user_id → USERS(user_id) |
| SYSTEM_SETTINGS | setting_id | setting_id (int, auto_increment), setting_name (varchar(100)), setting_value (text), updated_at (datetime) | UNIQUE(setting_name) |

#### 5.1.8.1 Database Design Alignment with System Requirements

The database design was developed to support the functional requirements of the Internship Opportunities Information System. The mapping below demonstrates how the database structure directly supports the identified system requirements.

**Table 10: Requirement-to-Database Design Mapping**

| Requirement | Supporting Entities |
|---|---|
| User Registration and Authentication | USERS |
| Student Profile Management | STUDENTS |
| Organization Management | ORGANIZATIONS |
| Internship Opportunity Management | INTERNSHIPS |
| Internship Search and Application | APPLICATIONS, INTERNSHIPS |
| Internship Placement Management | PLACEMENTS |
| Logbook Management | STUDENT_LOGBOOKS |
| Final Report Submission | STUDENT_FINAL_REPORTS |
| Communication and Notifications | NOTIFICATIONS |
| Supervisor Monitoring | SUPERVISOR_STUDENT_NOTES |
| Report Generation and Analytics | REPORTS |
| Security Monitoring and Accountability | AUDIT_LOGS, USER_SESSIONS |

#### 5.1.8.2 Database Normalization

The database design was normalized up to Third Normal Form (3NF) to eliminate redundancy and improve data integrity.

First Normal Form (1NF) ensured that all attributes contain atomic values and eliminated repeating groups.

Second Normal Form (2NF) eliminated partial dependencies by separating data into independent tables representing specific entities.

Third Normal Form (3NF) removed transitive dependencies to ensure that all non-key attributes depend solely on the primary key.

Normalization minimized data duplication, improved consistency, and prevented insertion, update, and deletion anomalies within the Internship Opportunities Information System.

#### 5.1.8.3 Scalability and Performance

The database was designed to support future growth and increasing system utilization. Performance was enhanced through the use of indexed primary keys and foreign keys to facilitate efficient retrieval of internship records, applications, notifications, and reports.

The design adopted normalized relational structures that reduce redundancy while improving query performance. Operational data was separated from audit and session records to enhance maintainability and minimize processing overhead.

In addition, the three-tier architecture supports independent scaling of the presentation, application, and database layers. The system can therefore accommodate increasing numbers of students, organizations, internship opportunities, and concurrent users without requiring major structural modifications.

#### 5.1.8.4 Handling Historical Data

The database design incorporated mechanisms for preserving historical internship information to support reporting, monitoring, and institutional accountability.

Historical information is maintained through internship application records, placement records, student logbooks, final internship reports, notifications, user session histories, and audit logs. Rather than permanently deleting critical records, the system employs status-based management and archival mechanisms that preserve historical information while maintaining operational efficiency.

These measures ensure that previous internship activities remain accessible for programme evaluation, student progress tracking, administrative review, and future reference.

#### 5.1.8.5 Security and Data Privacy

The system incorporated multiple security mechanisms to ensure the confidentiality, integrity, and availability of internship-related information.

User authentication was strengthened through secure password hashing mechanisms to ensure that user credentials are not stored in plain text within the database. Role-Based Access Control (RBAC) was implemented to ensure that students, organizations, supervisors, coordinators, and administrators access only information relevant to their responsibilities.

The system further incorporated controlled access rules at both application and database levels to protect sensitive information such as student profiles, internship applications, placement records, and institutional reports.

To enhance accountability, the system includes an audit logging mechanism through the AUDIT_LOGS table, which records user activities including logins, data updates, application processing, report generation, and administrative actions. This enables monitoring of system usage and detection of unauthorized activities.

Input validation and sanitization mechanisms were implemented to prevent malicious attacks such as SQL injection and cross-site scripting. Secure session management controls were also incorporated to protect active user sessions from unauthorized access.

In addition, sensitive data and system backups are protected through encryption mechanisms, while communication between clients and the server is secured through HTTPS protocols to safeguard information during transmission.

## 5.2 System Implementation

System implementation involved converting the approved system design into a fully functional web-based Internship Opportunities Information System. During this phase, the designed modules, database, interfaces, and system functionalities were developed, integrated, and configured to operate as a complete application.

The system was implemented using modern web development technologies comprising HTML5, CSS3, Bootstrap, and JavaScript for the user interface, PHP for server-side processing, and MySQL as the relational database management system. The development environment consisted of Visual Studio Code as the source code editor and Wamp server as the local web server for hosting the Apache web server and MySQL database during development and testing.

Implementation was carried out incrementally, beginning with database creation, followed by development of the authentication module, internship opportunity management module, internship application module, employer management module, notification services, reporting module, and administrative functions. Each module was integrated with the centralized database to ensure data consistency and seamless interaction across the system.

Upon completion of development, the integrated system was subjected to functional testing and validation to verify that all modules operated correctly and satisfied the specified functional and non-functional requirements. The implementation process resulted in a secure, reliable, user-friendly, and scalable Internship Opportunities Information System capable of improving internship information management and service delivery at EASLIS.

The Internship Opportunities Information System for EASLIS was implemented as a modular, database-driven web system. The system is composed of several interrelated components that collectively support internship advertisement, application processing, placement management, supervision, reporting, and system administration. These components interact seamlessly to ensure efficient workflow automation, secure data management, and real-time information access for all stakeholders.

### 5.2.1 User Authentication and Access Control

The system implements a secure authentication and role-based access control mechanism that regulates how users interact with the platform.

Figure 11: Shows the system login homepage

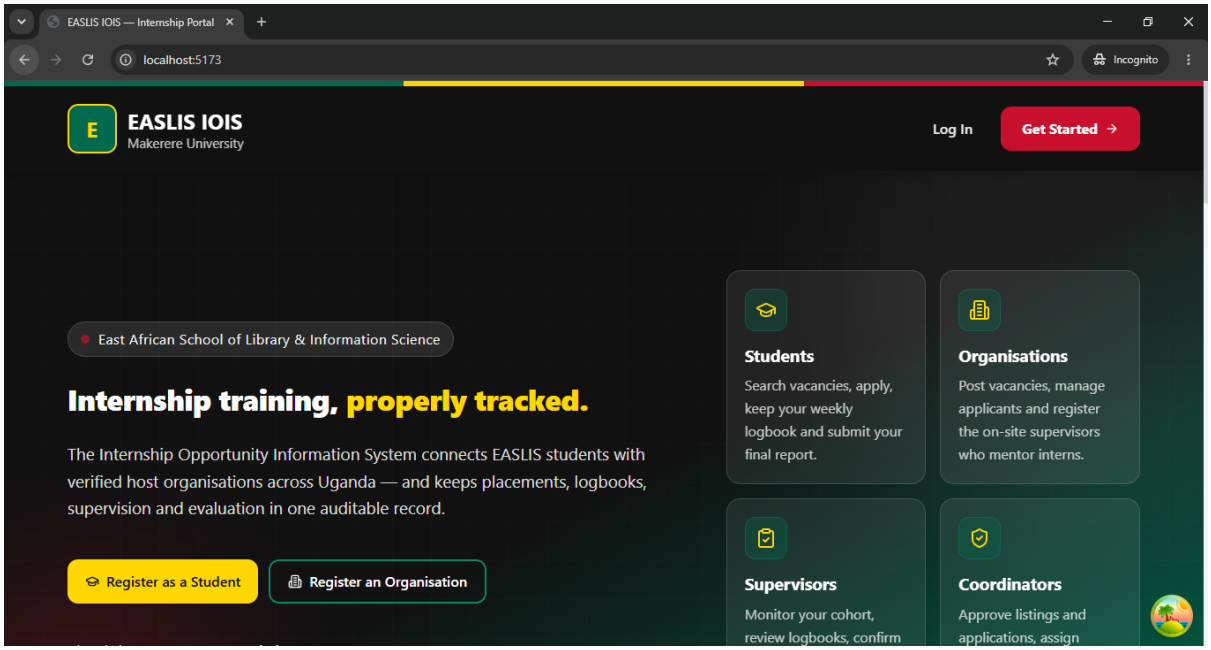



Figure 12: Shows the system login page form

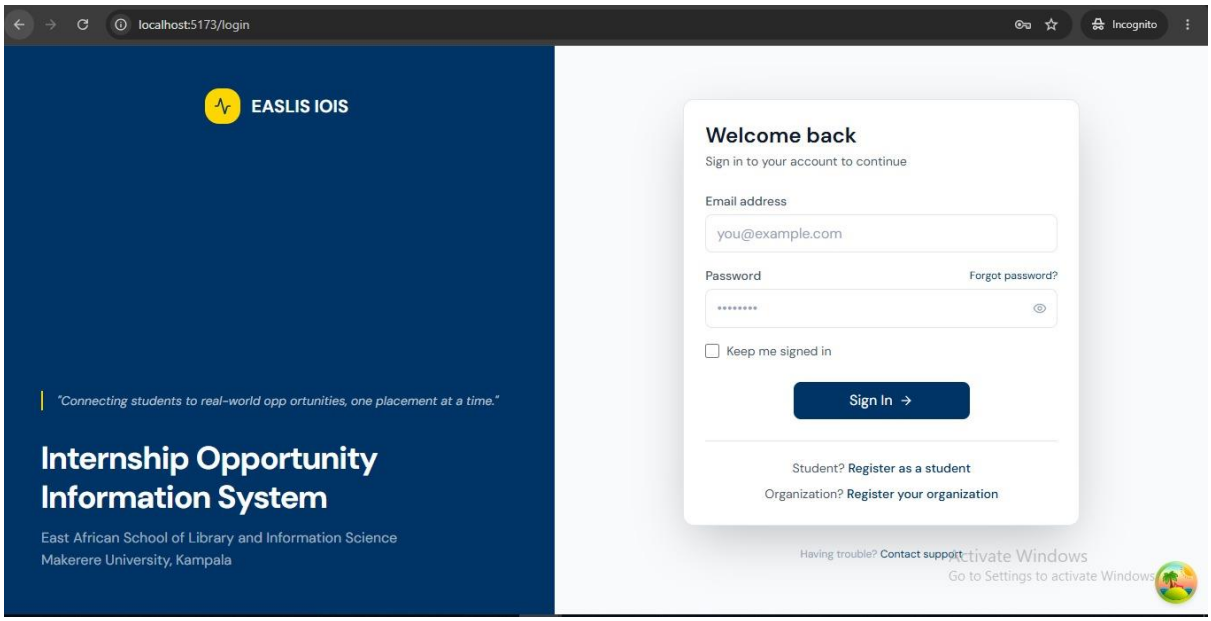
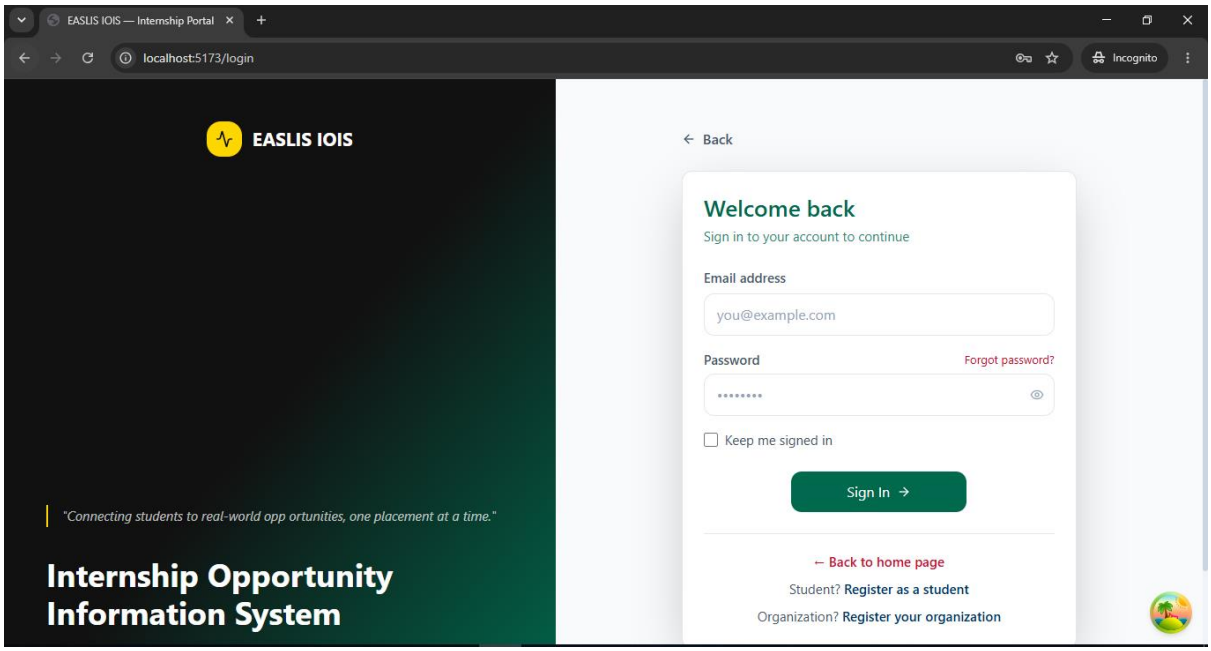


Figure 13: Shows Successful login into the admin portal of the system



### 5.2.2 Organization Management and Verification

This module manages the registration, verification, and administration of organizations that offer internship opportunities.

Figure 14: Shows the organization registration module page

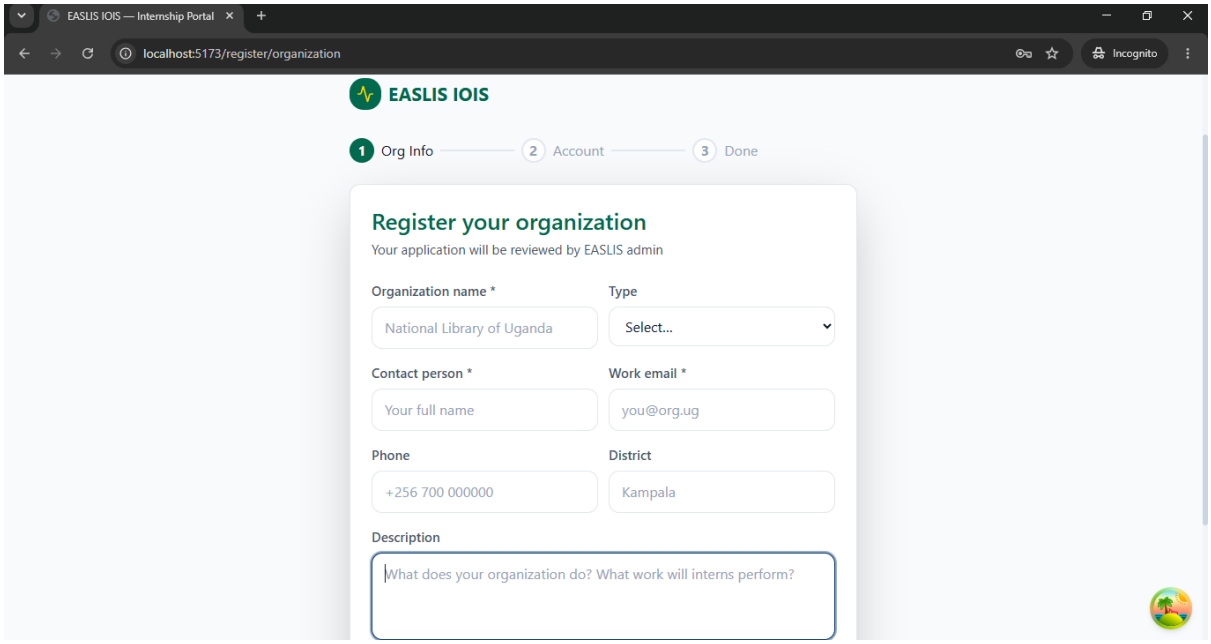
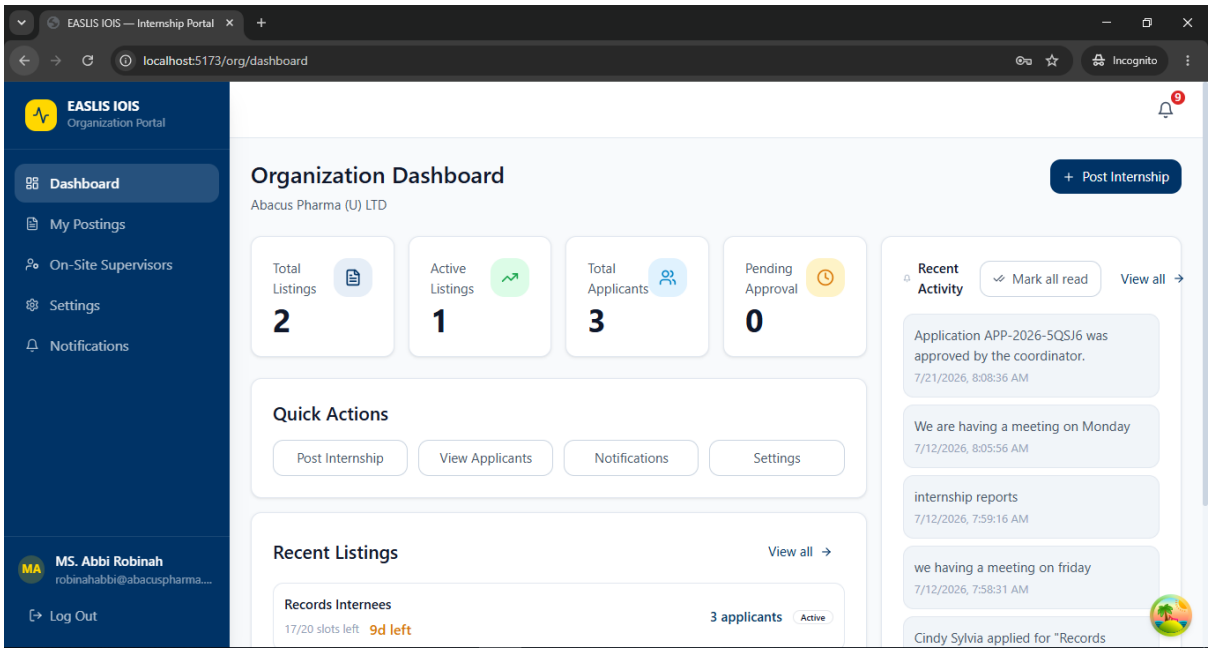



Figure 15: Shows the organization management module page



### 5.2.3 Application Processing Module

The application processing component enables students to apply for available internship opportunities.

Figure 16: Shows the student application and processing modules page

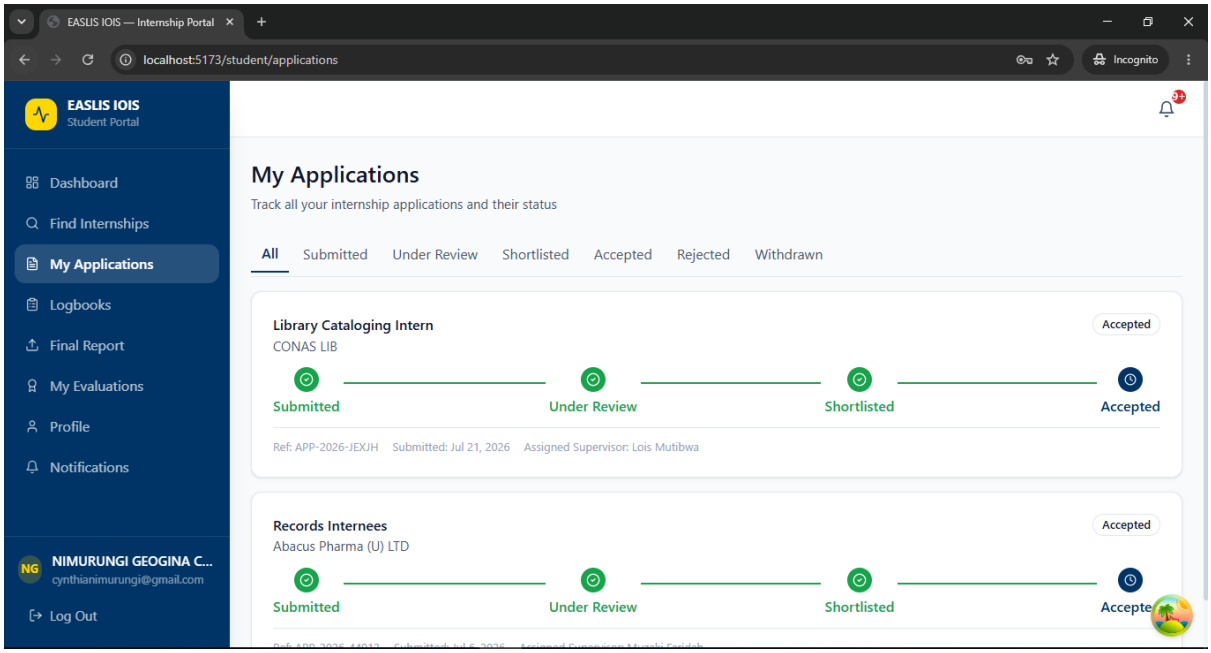



Figure 17: Shows the student registration page module

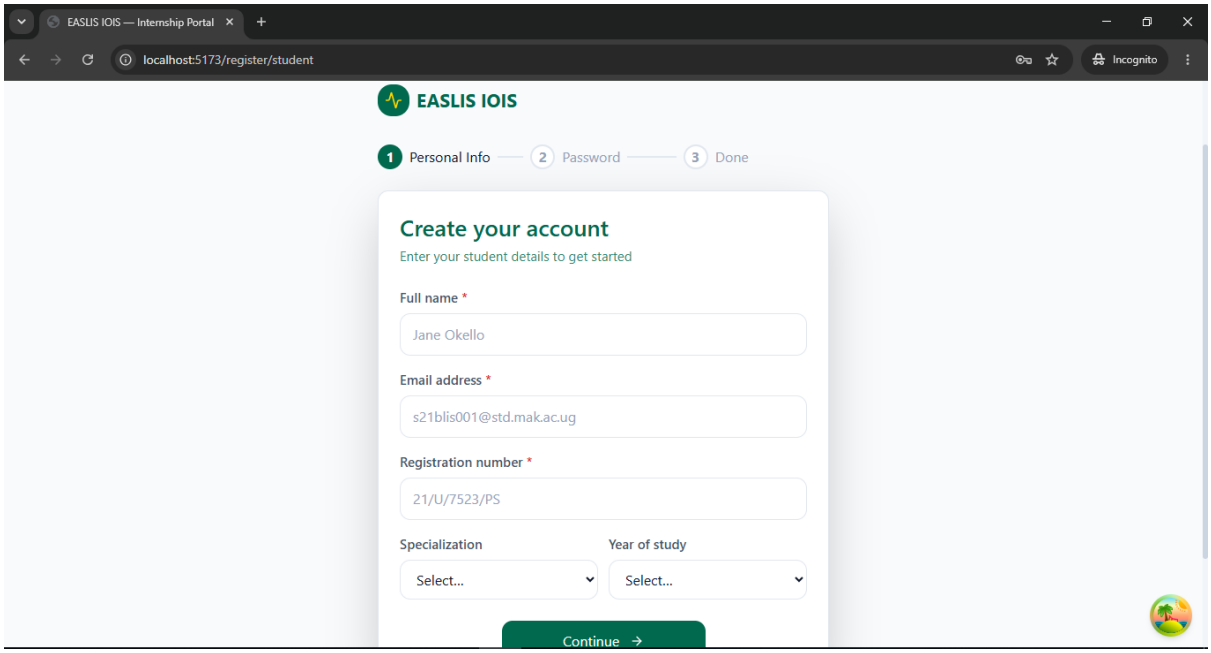
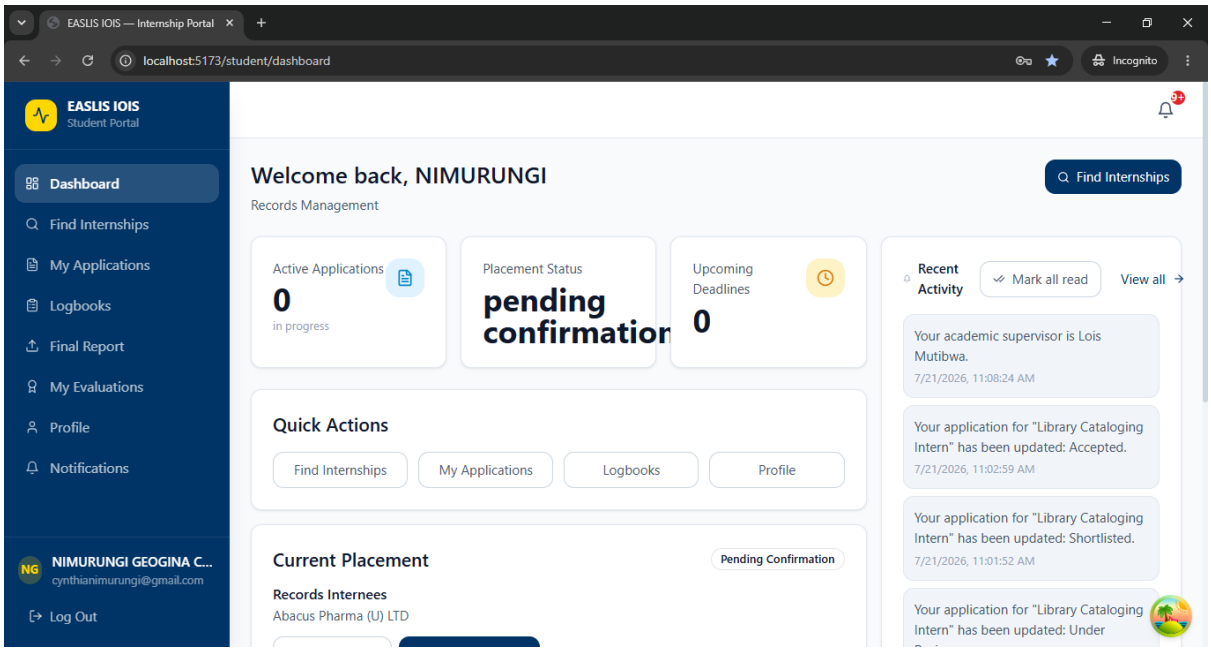


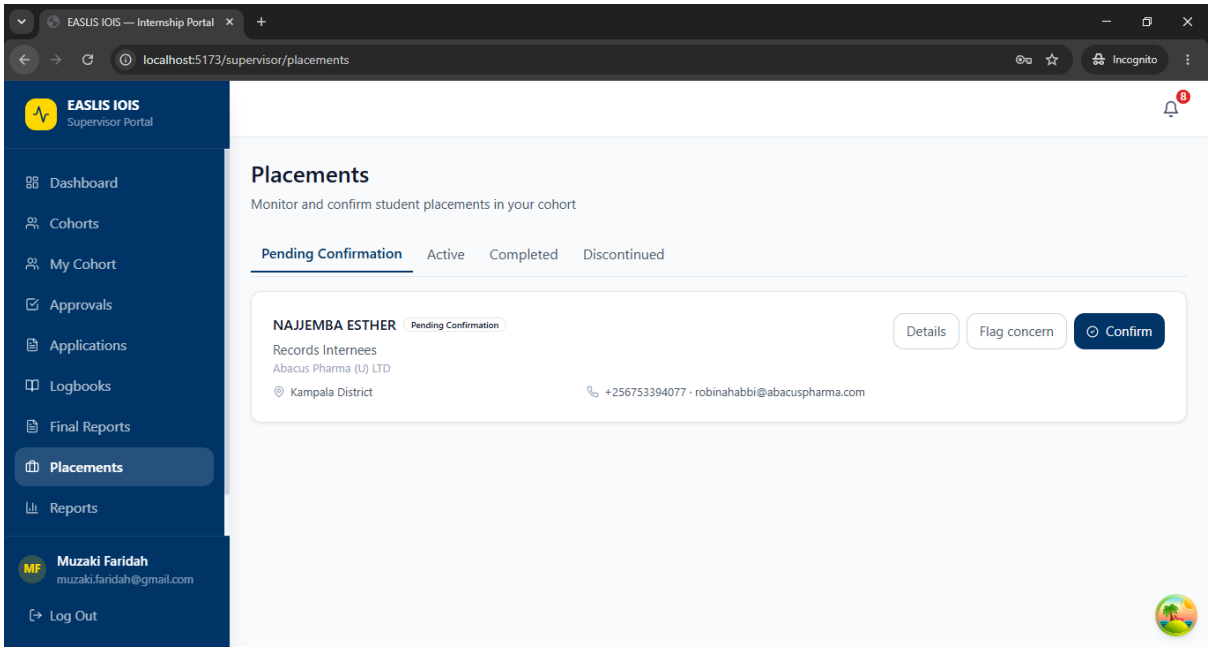
Figure 18: Shows the student portal dashboard module page



### 5.2.4 Placement Management System

This module handles the allocation and confirmation of internship placements. Once applications are approved, students are assigned to organizations and supervisors are allocated accordingly.

Figure 19: Shows the placement management system on the supervisor portal



### 5.2.5 Logbook and Report Management

This component supports continuous monitoring of student internship progress through daily logbook submissions and final internship reports.

Figure 20: Shows the logbook management module on the student portal

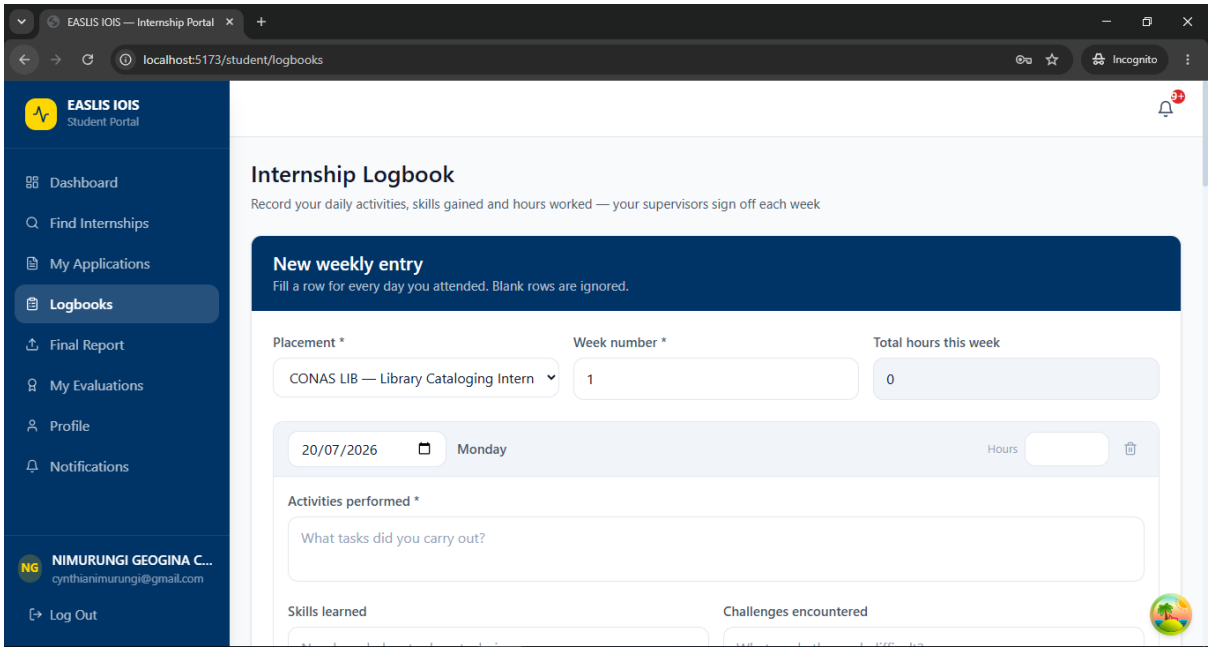



Figure 21: Shows the final report management module page on the student portal

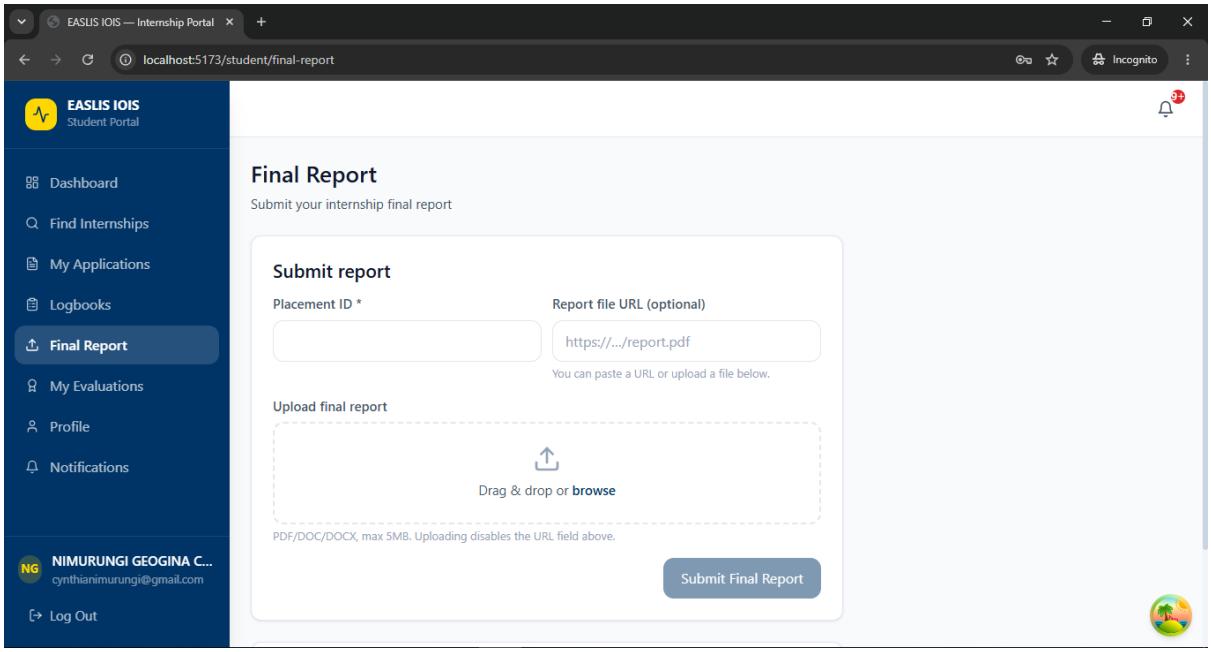


Figure 22: Shows the logbooks management module page on the Supervisor's portal

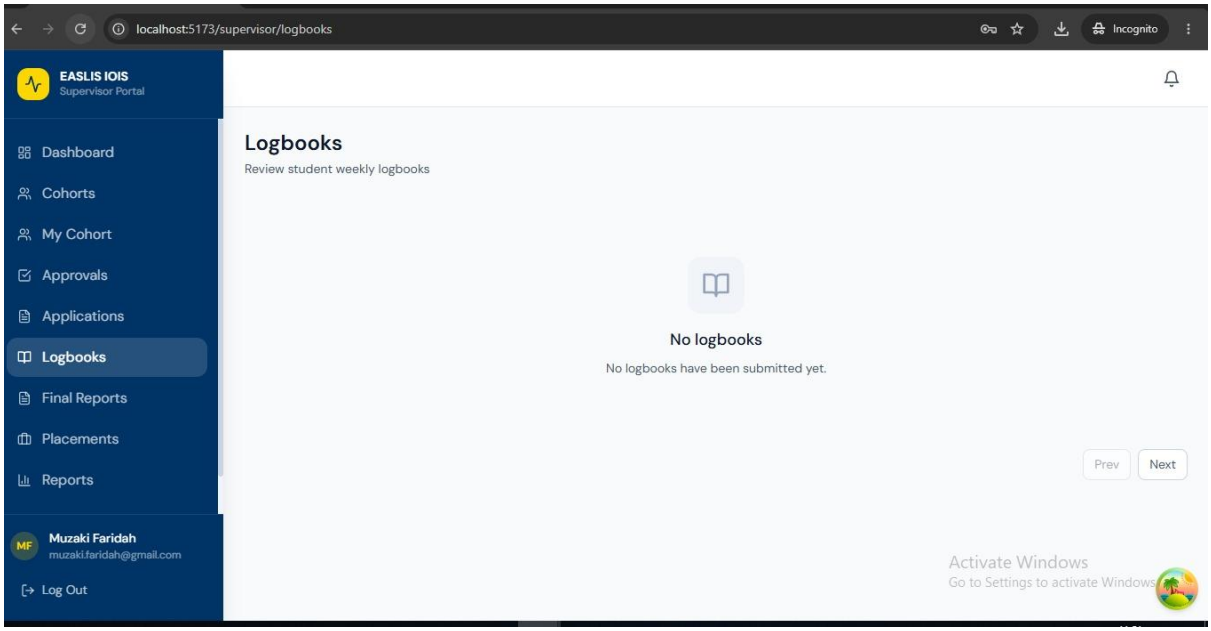
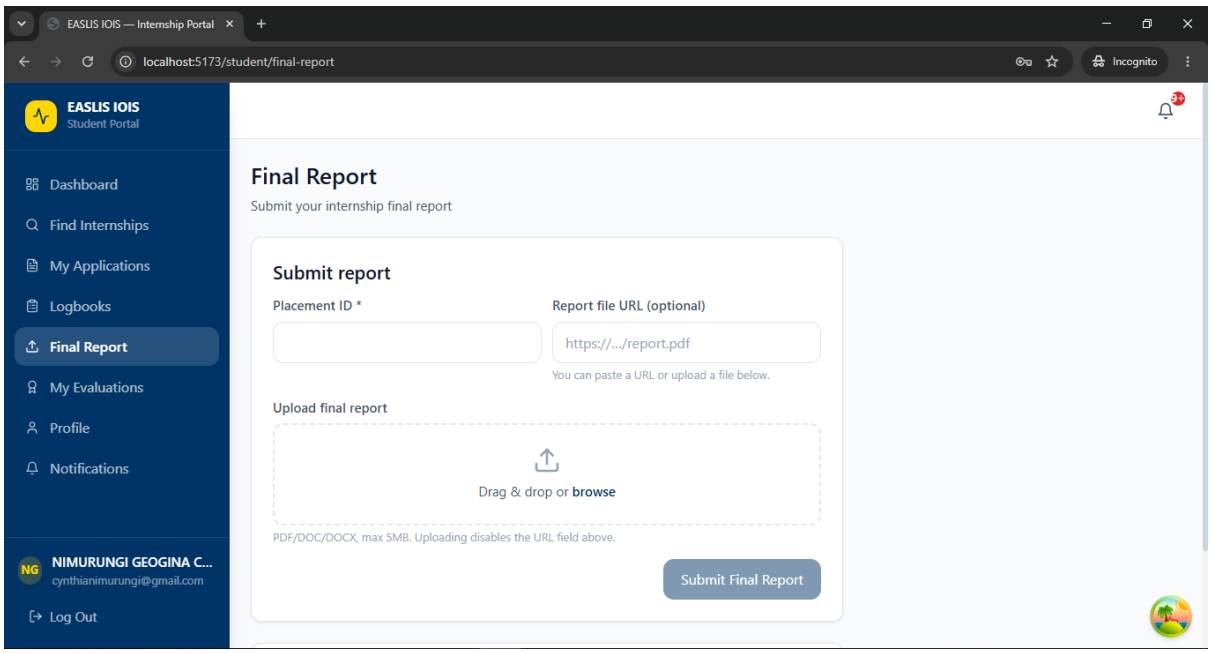



Figure 23: Shows the final report management module page on the supervisor portal



### 5.2.6 Cohort and Supervisor Management

The system includes a  supervisor and cohort management feature that groups students based on specialization and academic year.

Figure 24: Shows the supervisor management module dashboard page

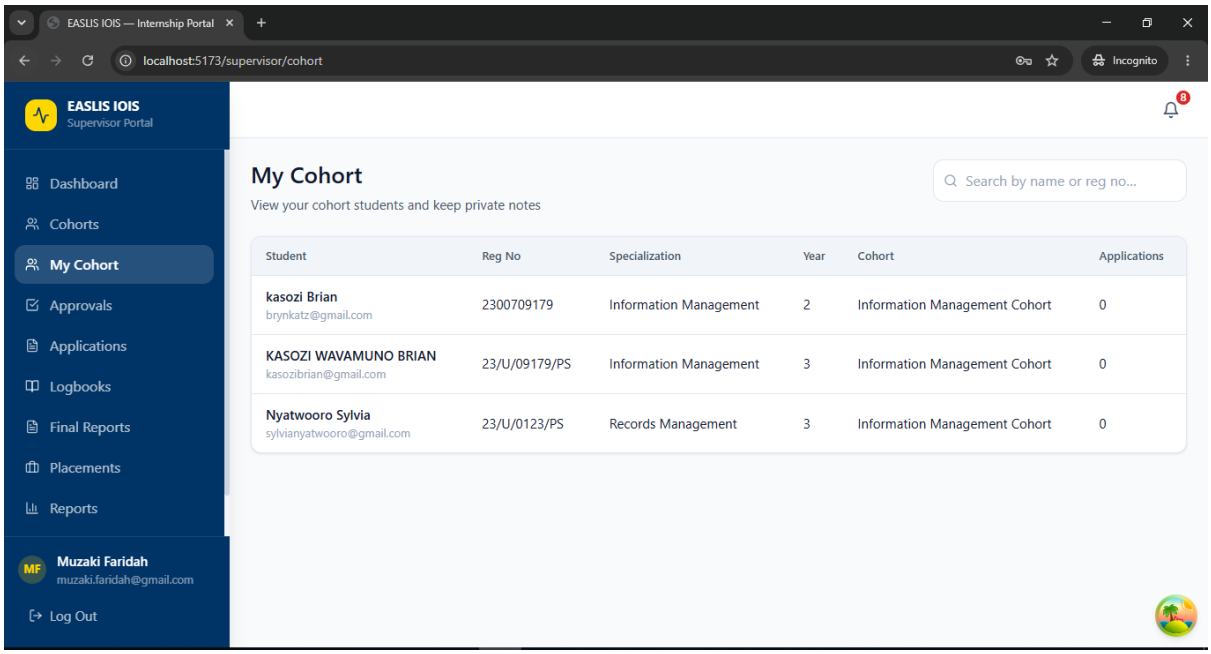



Figure 25:  Shows the cohort management module page on the supervisor portal

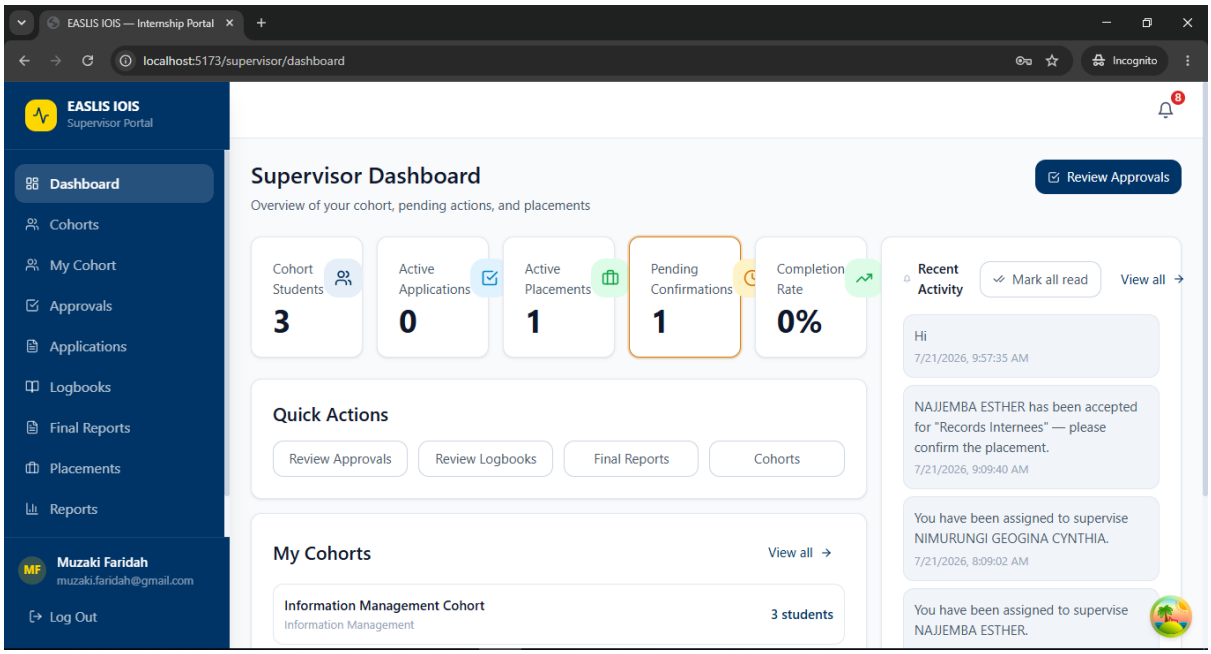


Figure 26: Shows the supervisor specified and allocated cohort module page

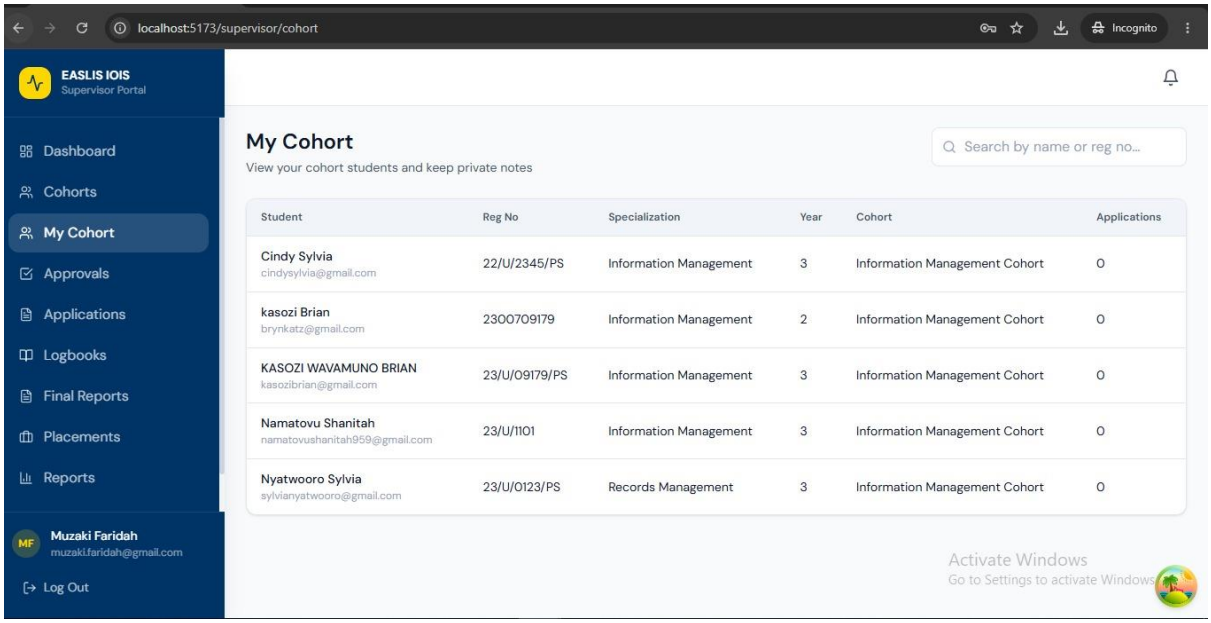
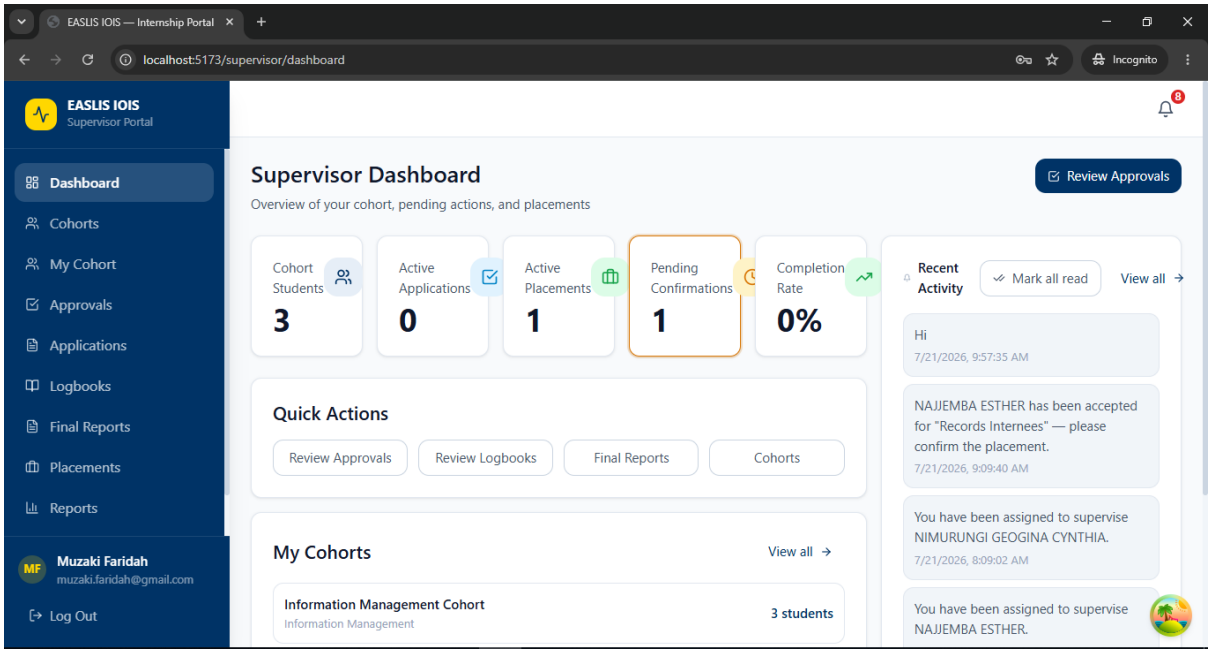


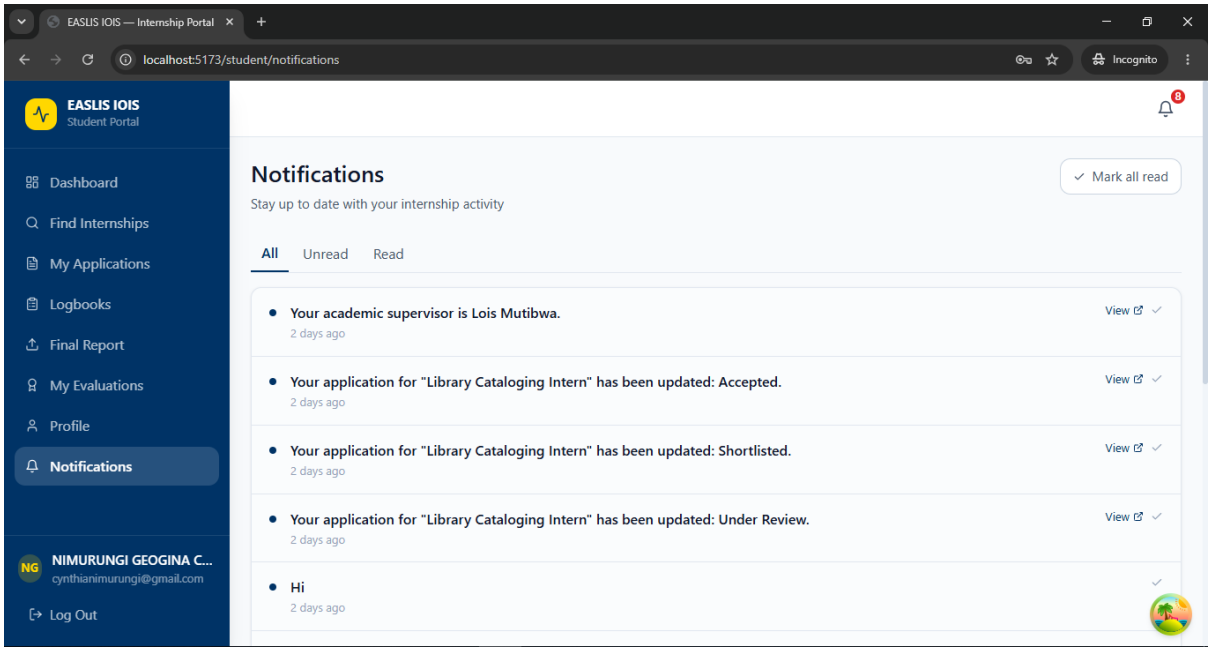

Figure 27: Shows the Supervisor management dashboard page



### 5.2.7 Notification and Communication Module

The notification system provides real-time communication between users and the system. It sends alerts for application updates, organization verification results, placement confirmations, and report submissions.

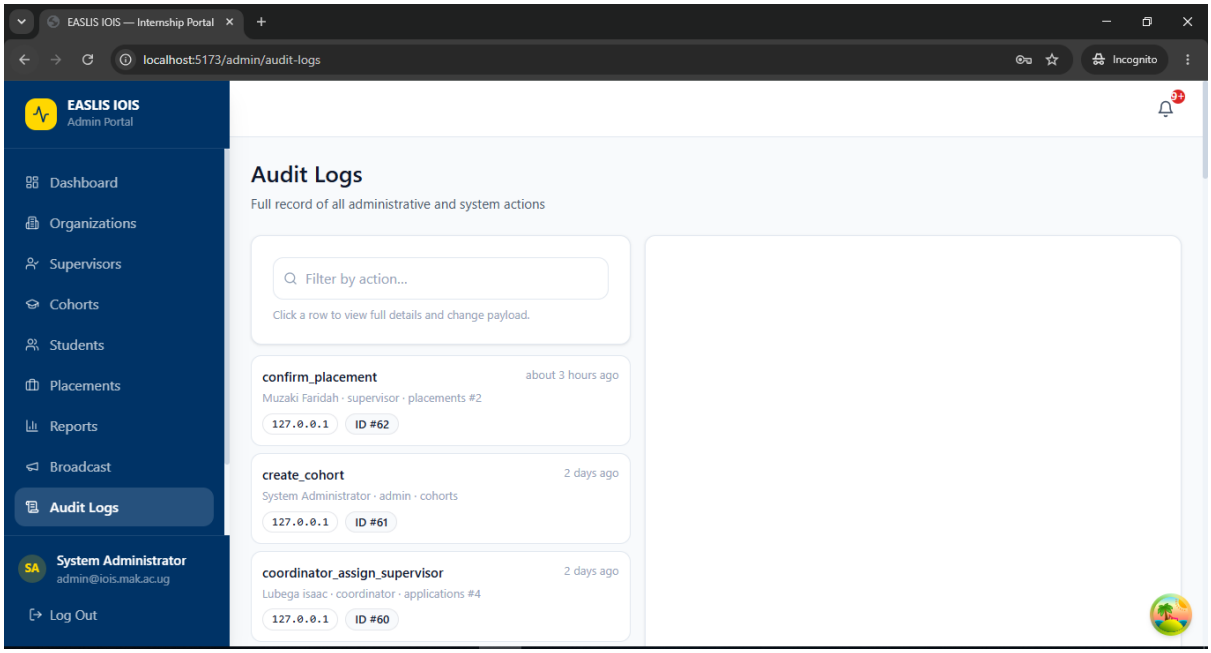
Figure 28: Shows the system notification and communication module page on the student portal




### 5.2.8 Audit Logging and Activity Monitoring

To enhance accountability and system security, the IOIS incorporates an audit logging mechanism that records all user activities, including logins, data modifications, submissions, and approvals.

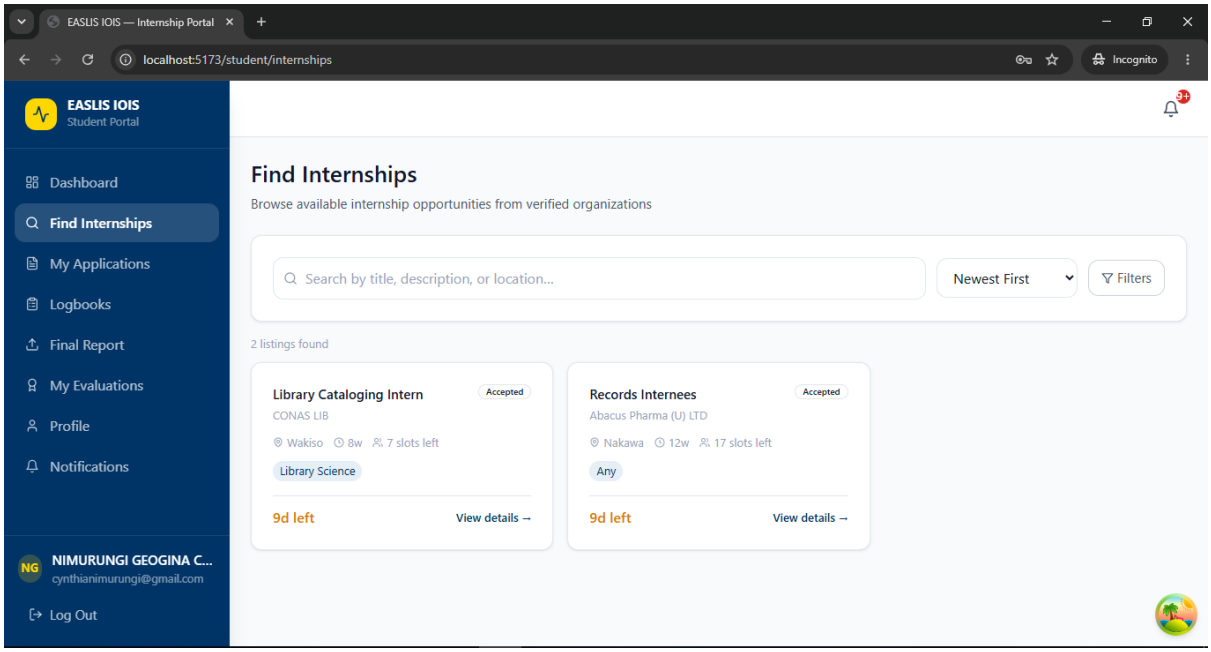
Figure 29: Shows the system audit logging and activity monitoring module page




### 5.2.9 Search and Internship Discovery Module

This component enables users especially students and coordinators to search and filter internship opportunities based on criteria such as specialization, location, organization, and application status.

Figure 30: Shows the student search and internship discovery module page



# CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATION

## 6.0 Introduction

This chapter presents the summary of findings, conclusions, and recommendations of the study. The project sought to examine existing internship opportunities management practices at EASLIS and their limitations, identify requirements for developing an Internship Opportunities Information System, design and develop the system, and test and validate the developed solution.

## 6.1 Summary of Findings

### 6.1.1 Existing Internship Opportunities Management Practices and Their Limitations

The first objective was achieved through an assessment of the existing internship opportunities management practices at EASLIS. Findings revealed that internship opportunities were mainly disseminated through notice boards, emails, social media platforms, internship coordinators, and informal communication channels.

Although these methods facilitated the sharing of internship information, several limitations were identified. Information was scattered across multiple platforms, making access difficult and inconsistent. Students often experienced delays in obtaining internship opportunities, while administrators faced challenges in monitoring applications and maintaining internship records.

The findings further revealed limited communication, inefficient record management, increased administrative workload, and difficulties in tracking internship opportunities and student applications. These challenges justified the need for a centralized Internship Opportunities Information System.

### 6.1.2 Requirements for Developing an Internship Opportunities Information System

The second objective was accomplished through requirements elicitation involving students, academic staff, internship coordinators, administrative staff, and ICT personnel.

The findings established that stakeholders required functionalities such as user registration and authentication, internship opportunity posting and management, internship search and filtering, online application submission, application tracking, employer profile management, notification services, communication facilities, and reporting capabilities.

The study also identified non-functional requirements including usability, security, reliability, scalability, maintainability, availability, and performance efficiency. These requirements provided the foundation for system design and development.

### 6.1.3 Design and Development of the Internship Opportunities Information System

The third objective focused on the design and development of the Internship Opportunities Information System.

Based on the identified requirements, a centralized web-based system was designed and developed using a modular architecture and relational database environment. The system incorporated several integrated modules including User Management, Internship Opportunity Management, Internship Search and Application Processing, Communication and Notification Services, Reporting and Analytics, and Administration.

The developed system provides a unified platform for managing internship opportunities, facilitating online applications, improving communication, and supporting internship-related decision-making.

### 6.1.4 Testing and Validation of the Developed System

The fourth objective focused on testing and validating the developed system.

Testing results demonstrated that the system effectively supports internship opportunity management activities including opportunity posting, searching, application submission, tracking, communication, and reporting. Users were able to perform required tasks successfully with minimal assistance.

Feedback from respondents indicated improvements in accessibility to internship information, efficiency of internship management processes, communication among stakeholders, and overall user satisfaction. The testing process confirmed that the system performed reliably and met the identified user requirements.

## 6.2 Conclusion

The project successfully achieved all the objectives that guided the development of the Internship Opportunities Information System for EASLIS, Makerere University.

The assessment of existing practices revealed significant challenges associated with fragmented information dissemination, manual record management, delayed communication, limited monitoring capabilities, and increased administrative workload. These challenges

highlighted the need for a centralized and efficient internship opportunities management platform.

Through stakeholder engagement, the study identified the functional and non-functional requirements necessary for developing a system capable of addressing these challenges. Guided by these requirements, a web-based Internship Opportunities Information System was successfully designed and developed to support internship opportunity dissemination, application management, communication, monitoring, and reporting.

Testing and validation confirmed that the developed system improves accessibility to internship opportunities, enhances information management, strengthens stakeholder coordination, and reduces administrative workload. The system therefore provides a practical, reliable, and sustainable solution for internship opportunities management at EASLIS.

### 6.3 Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

*Continuous User Training*

EASLIS should organize regular training and orientation sessions for students, internship coordinators, academic staff, employers, and system administrators. Continuous training will enable users to understand the system's features, improve their technical competence, and ensure that the system is utilized effectively. Regular refresher training should also be conducted whenever new features are introduced to minimize user errors and promote user acceptance.

*Full System Implementation*

The developed Internship Opportunities Information System should be fully deployed and adopted as the official platform for managing internship opportunities within EASLIS. Full implementation will eliminate reliance on fragmented communication channels such as notice boards, emails, and social media platforms, thereby improving accessibility, efficiency, transparency, and consistency in internship management

*Strengthening Data Backup and Recovery*

EASLIS should establish comprehensive data backup and disaster recovery procedures to safeguard internship records and user information against accidental deletion, hardware failure,

cyberattacks, or other unforeseen events. Regular automated backups, secure off-site storage, and periodic testing of recovery procedures should be implemented to ensure that data can be restored quickly whenever necessary.

*Infrastructure Enhancement*

The University should invest in adequate ICT infrastructure, including reliable computer equipment, dedicated servers, stable internet connectivity, and uninterrupted power supply. Improved infrastructure will enhance system availability, increase processing speed, reduce downtime, and provide users with a reliable environment for accessing internship opportunities and related services.

*Continuous System Maintenance*

The Internship Opportunities Information System should undergo regular maintenance to ensure optimal performance and long-term sustainability. Maintenance activities should include software updates, bug fixes, database optimization, performance monitoring, and incorporation of user feedback. Continuous maintenance will help the system remain compatible with evolving technologies and changing institutional requirements.

*Enhanced Security Measures*

Additional security mechanisms should be implemented to protect the confidentiality, integrity, and availability of system data. These measures should include strong password policies, role-based access control, multi-factor authentication where applicable, routine security audits, continuous monitoring of user activities, and timely installation of security patches. Such controls will minimize the risk of unauthorized access, data breaches, and other cybersecurity threats.

*Institutional Integration*

Future development should focus on integrating the Internship Opportunities Information System with other university information systems, such as the Student Information System, Academic Records Management System, Learning Management System, and alumni databases. System integration will improve information sharing, eliminate duplicate data entry, enhance administrative efficiency, and support informed decision-making across the institution.

*Periodic System Evaluation*

EASLIS should conduct regular evaluations of the system to assess its effectiveness, usability, performance, and user satisfaction. Feedback obtained from students, employers, coordinators, and administrators should be analysed to identify strengths, weaknesses, and emerging user requirements. The evaluation findings should guide future system improvements and ensure that the system continues to meet institutional objectives and technological advancements

### 6.3.1 Future Work

The following future enhancements are recommended:

Integration with Makerere University student information systems.

SMS and email notification services for internship alerts and application updates.

Mobile application development for Android and iOS platforms.

Integration with employer recruitment and placement systems.

Online internship supervision and evaluation modules.

Cloud-based deployment for improved accessibility and scalability.

AI-based internship recommendation and matching features.

Real-time analytics and reporting dashboards.

Integration with professional networking platforms.

Automated internship performance assessment and feedback modules.

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# APPENDICES

## Appendix I: Interview Guide for the students

### Introduction

We are final-year students from the East African School of Library and Information Science, Makerere University, pursuing a bachelor's degree in library and information science. As part of our academic research project, we are conducting a study aimed at developing an Internship Opportunities Information System for EASLIS. The purpose of this study is to examine the current internship opportunities management practices, identify existing challenges, establish system requirements, and propose a web-based solution to improve internship information management and access.

Your participation in this interview is voluntary, and all information provided will be treated with strict confidentiality and used solely for academic purposes. You may choose not to answer any question or withdraw from the interview at any stage without any consequences. With your permission, the interview may be recorded to ensure accuracy during data analysis.

### Section A: Background Information

1) What programme and year of study are you enrolled in?
2) Have you previously participated in an internship programme?
3) How did you obtain information about internship opportunities?
4) How important are internship opportunities to your academic and professional development?

### Section B: Existing Internship Opportunities Management Practices

5) How do students currently receive information about internship opportunities?
6) What sources do you commonly use when searching for internship opportunities?
7) How easy is it to access internship-related information at EASLIS?
8) What information is usually provided regarding available internship opportunities?
9) How do students apply for internship placements?
10) How effective are the current methods used to communicate internship opportunities?

### Section C: Challenges in Current Practices

11) What challenges do you encounter when searching for internship opportunities?

12) Have you ever missed an internship opportunity due to delayed communication? Please explain.
13) How difficult is it to identify suitable internship providers?
14) What challenges do you experience when submitting internship applications?
15) How do current internship information management practices affect students?
16) Which challenge do you consider the most significant and why?

**Section D: Possible Solutions**

17) What improvements would you recommend in the management of internship opportunities?
18) How can technology improve access to internship opportunities?
19) What information would you like to receive regularly regarding internships?
20) What features would make internship searching easier for students?
21) How can communication between students and internship coordinators be improved?

**Section E: System Requirements**

22) What functions would you expect from the proposed Internship Opportunities Information System?
23) Should students be able to search and filter internship opportunities? Why?
24) Should the system support online internship applications? Why?
25) What information should be displayed about internship providers?
26) What notification features would be useful to students?
27) What reports or records should students be able to access through the system?

**Section F: System Development and Validation**

28) What design features would make the system easy to use?
29) Which devices would you prefer to use when accessing the system?
30) How likely would you be to use the proposed system?
31) What factors would encourage continued use of the system?
32) How would you evaluate the success of the proposed system?

**Section G: General Comments**

33) What additional features would you recommend?
34) Do you have any other comments or suggestions regarding the proposed system?

**Closing Statement**

Thank you very much for taking the time to participate in this interview. Your valuable insights and experiences will greatly contribute to the successful development of an Internship Opportunities Information System for EASLIS and the improvement of internship management processes within the institution.

## Appendix II: Interview Guide for Academic Staff

### Introduction

We are final-year students from the East African School of Library and Information Science, Makerere University, pursuing a bachelor's degree in library and information science. As part of our academic research project, we are conducting a study aimed at developing an Internship Opportunities Information System for EASLIS. The purpose of this study is to examine the current internship opportunities management practices, identify existing challenges, establish system requirements, and propose a web-based solution to improve internship information management and access.

Your participation in this interview is voluntary, and all information provided will be treated with strict confidentiality and used solely for academic purposes. You may choose not to answer any question or withdraw from the interview at any stage without any consequences. With your permission, the interview may be recorded to ensure accuracy during data analysis.

### Section A: Background Information

1) Please describe your role and responsibilities in relation to student internships.
2) How long have you been involved in internship supervision or coordination?
3) What categories of students do you supervise during internship programmes?

### Section B: Existing Internship Opportunities Management Practices

4) How are internship opportunities currently identified and communicated to students?
5) What role do academic staff play in internship placement processes?
6) How are internship applications reviewed and approved?
7) How are internship providers identified and maintained?
8) How are students monitored during internship placements?
9) What records and reports are generated during internship management?

### Section C: Challenges in Current Practices

10) What challenges do you face when coordinating internship activities?
11) What difficulties do students commonly experience?
12) Are there delays in communicating internship opportunities? What causes them?
13) How effective are the current internship information management practices?
14) What challenges exist in monitoring student placements and progress?

15) Which challenge do you consider most critical?

**Section D: Possible Solutions**

16) What improvements would enhance internship management?
17) Which internship management processes should be automated?
18) How can communication between students and supervisors be improved?
19) What measures would ensure that internship information remains current and accurate?
20) What benefits would result from implementing an Internship Opportunities Information System?

**Section E: System Requirements**

21) What information should the proposed system capture and maintain?
22) What functions should be available to academic staff?
23) What reports should the system generate?
24) What search and filtering capabilities should be provided?
25) What security and access control measures should be implemented?
26) What notification and reminder features would be useful?

**Section F: System Development and Validation**

27) What user interface features would make the system easy to use?
28) What factors would influence acceptance of the proposed system?
29) What training would users require?
30) How would you assess whether the system is functioning effectively?
31) What criteria would you use to evaluate the system's success?

**Section G: General Comments**

32) What recommendations would you provide for successful implementation?
33) What additional features should be incorporated into the system?
34) Do you have any additional comments or suggestions?

**Closing Statement**

Thank you very much for taking the time to participate in this interview. Your valuable insights and experiences will greatly contribute to the successful development of an Internship Opportunities Information System for EASLIS and the improvement of internship management processes within the institution.

## Appendix III: Interview Guide for Administrative Personnel

### Introduction

We are final-year students from the East African School of Library and Information Science, Makerere University, pursuing a bachelor's degree in library and information science. As part of our academic research project, we are conducting a study aimed at developing an Internship Opportunities Information System for EASLIS. The purpose of this study is to examine the current internship opportunities management practices, identify existing challenges, establish system requirements, and propose a web-based solution to improve internship information management and access.

Your participation in this interview is voluntary, and all information provided will be treated with strict confidentiality and used solely for academic purposes. You may choose not to answer any question or withdraw from the interview at any stage without any consequences. With your permission, the interview may be recorded to ensure accuracy during data analysis.

### Section A: Background Information

Please describe your position and responsibilities at EASLIS.

How long have you been involved in administrative activities related to student internships?

What role does your office play in managing internship-related information?

### Section B: Existing Internship Opportunities Management Practices

How are internship opportunities currently received and recorded?

How is internship information communicated to students?

What procedures are followed when students apply for internship placements?

How are internship providers and host organizations documented and maintained?

What records are maintained regarding internship opportunities and placements?

How are internship reports generated and shared with management?

How effective are the current internship management procedures?

### Section C: Challenges in Current Practices

What challenges do you face in managing internship-related information?

Are there delays in disseminating internship opportunities? What causes them?

What difficulties exist in maintaining accurate internship records?

How easy is it to track student applications and placements?

Are there cases of missing, duplicated, or outdated internship information?

How do these challenges affect service delivery and decision-making?

Which challenge do you consider most significant?

**Section D: Possible Solutions**

What improvements would enhance internship management within EASLIS?

Which administrative processes should be automated?

How can communication between students and administrators be improved?

What measures would improve record management and reporting?

What benefits would you expect from the proposed system?

**Section E: Administrative Requirements for the Proposed System**

What information should be captured by the system?

What reports should the system generate for management purposes?

What information should administrators be able to update or manage?

What monitoring features should be included?

What notification features would support administrative work?

What controls should be put in place to ensure data accuracy?

What information should be available to students and academic staff?

**Section F: System Evaluation**

How would you assess the effectiveness of the proposed system?

What indicators would demonstrate successful implementation?

What challenges might affect adoption of the system?

What recommendations would ensure successful implementation?

**Section G: General Comments**

What additional features would you recommend?

Do you have any additional comments or suggestions?

**Closing Statement**

Thank you very much for taking the time to participate in this interview. Your valuable insights and experiences will greatly contribute to the successful development of an Internship Opportunities Information System for EASLIS and the improvement of internship management processes within the institution.

## Appendix IV: Interview Guide for ICT Personnel

### Introduction

We are final-year students from the East African School of Library and Information Science, Makerere University, pursuing a bachelor's degree in library and information science. As part of our academic research project, we are conducting a study aimed at developing an Internship Opportunities Information System for EASLIS. The purpose of this study is to examine the current internship opportunities management practices, identify existing challenges, establish system requirements, and propose a web-based solution to improve internship information management and access.

Your participation in this interview is voluntary, and all information provided will be treated with strict confidentiality and used solely for academic purposes. You may choose not to answer any question or withdraw from the interview at any stage without any consequences. With your permission, the interview may be recorded to ensure accuracy during data analysis.

### Section A: Background Information

Please describe your current ICT role and responsibilities within Makerere University or EASLIS.

How long have you been involved in managing institutional information systems?

What information systems are currently used within EASLIS or the University?

### Section B: Existing Information Management Practices

What technologies are currently used to manage internship-related information?

How is internship information stored, accessed, and maintained?

What databases or repositories are currently used?

How is user access controlled in existing systems?

What communication technologies are used to disseminate information to students?

How are system backups and recovery processes currently handled?

### Section C: Technical Challenges

What technical challenges exist in the current management of internship information?

What limitations do existing systems have regarding accessibility and usability?

What challenges are associated with data storage and retrieval?

Are there any issues related to system integration?

What security vulnerabilities exist in current information management practices?

What challenges are associated with maintaining data integrity and consistency?

What infrastructure limitations might affect implementation of a new system?

Which technical challenge should be prioritized and why?

**Section D: Technical Solutions**

What technologies would you recommend for developing the proposed system?

What measures would improve system accessibility and availability?

How can system reliability be enhanced?

What approaches would ensure scalability of the proposed system?

How can system downtime be minimized?

What strategies would ensure long-term sustainability and maintenance?

**Section E: System Requirements and Design Considerations**

What functional requirements should the proposed system include?

What non-functional requirements should be considered?

What database architecture would be appropriate for the proposed system?

What user authentication mechanisms should be implemented?

What authorization and access-control levels should be incorporated?

What security measures should be implemented to protect user data?

What audit trail and logging capabilities should be included?

Should the system support role-based access control? Why?

What search and filtering functionalities should be incorporated?

What reporting and analytics capabilities should the system provide?

What API or integration capabilities should be considered?

What backup and disaster recovery mechanisms should be implemented?

What hosting environment would be most suitable for the system?

What performance metrics should be considered during development?

**Section F: System Development and Validation**

Which software development methodology would you recommend and why?

What testing procedures should be conducted before deployment?

How should system usability be evaluated?

What criteria should be used to validate system functionality?

How should system performance be measured?

What documentation should accompany the deployed system?

What training requirements should be considered for end users?

**Section G: Implementation and Sustainability**

What factors could affect successful implementation of the system?

What maintenance procedures should be established?

How should future upgrades and enhancements be managed?

What resources will be required to sustain the system?

**Section H: General Comments**

What additional technical features would you recommend?

Do you have any other comments or suggestions regarding the proposed Internship Opportunities Information System?

## Appendix V: Non-Participant Observation Guide for the Proposed Internship Opportunities Information System for EASLIS

### Introduction

This non-participant observation checklist is designed to systematically assess the current internship opportunities management practices, information flow processes, communication mechanisms, user interactions, and ICT infrastructure at the East African School of Library and Information Science, Makerere University.

The observation will support the study by providing real-time insights into:

• Existing internship opportunities management practices and workflows

• Challenges experienced in managing and accessing internship opportunities

• Communication and coordination mechanisms among stakeholders

• User interaction with current internship management processes

• Technological infrastructure available for supporting internship management

• Requirements for the proposed Internship Opportunities Information System

*Observation Details*

Date of Observation: .....

Observer: .....

Time: .....

Location: .....

### SECTION 1: EXISTING INTERNSHIP OPPORTUNITIES MANAGEMENT PRACTICES

Rating Scale: (1 = Very Poor, 2 = Poor, 3 = Fair, 4 = Good, 5 = Excellent)

| Observation Item | Yes | No | Rating (1–5) | Remarks |
|---|---|---|---|---|
| Internship opportunities are publicly displayed or communicated to students | ☐ | ☐ | | |
| Internship information is maintained in a structured format | ☐ | ☐ | | |
| Students can easily access internship opportunity information | ☐ | ☐ | | |
| Internship opportunities are updated regularly | ☐ | ☐ | | |
| Internship applications are formally recorded and tracked | ☐ | ☐ | | |
| Staff maintain records of internship providers/host organizations | ☐ | ☐ | | |
| Internship placement information is readily available when required | ☐ | ☐ | | |
| Communication between students and internship coordinators is evident | ☐ | ☐ | | |
| Internship-related documents are systematically managed | ☐ | ☐ | | |
| Internship reports and records are maintained for future reference | ☐ | ☐ | | |

**SECTION 2: CHALLENGES IN CURRENT INTERNSHIP MANAGEMENT PRACTICES**

| Observation Item | Observed (Yes/No) | Rating (1–5) | Remarks |
|---|---|---|---|
| Delays occur in communicating internship opportunities to students | ☐ | | |
| Students frequently seek clarification about internship opportunities | ☐ | | |
| Internship information appears incomplete or outdated | ☐ | | |
| Students experience difficulty locating internship information | ☐ | | |
| Multiple manual processes are involved in internship management | ☐ | | |
| Internship records are difficult to retrieve | ☐ | | |
| Communication breakdowns occur between stakeholders | ☐ | | |
| Internship placement tracking is difficult or inconsistent | ☐ | | |
| Duplicate or missing internship records are evident | ☐ | | |
| Staff spend excessive time managing internship-related information | ☐ | | |

## SECTION 3: EXISTING SOLUTIONS AND IMPROVEMENT OPPORTUNITIES

| Observation Item | Yes | No | Rating (1–5) | Remarks |
|---|---|---|---|---|
| Existing digital tools are used to support internship management | ☐ | ☐ | | |
| Electronic communication channels are used to share opportunities | ☐ | ☐ | | |
| Internship records are stored electronically | ☐ | ☐ | | |
| Staff use databases or spreadsheets for internship tracking | ☐ | ☐ | | |
| Mechanisms exist for updating internship information regularly | ☐ | ☐ | | |
| Students receive timely notifications regarding opportunities | ☐ | ☐ | | |
| Feedback mechanisms exist for internship stakeholders | ☐ | ☐ | | |
| Existing systems support monitoring of internship placements | ☐ | ☐ | | |

## SECTION 4: SYSTEM REQUIREMENTS AND ICT INFRASTRUCTURE

| Observation Item | Yes | No | Rating (1–5) | Remarks |
|---|---|---|---|---|
| Computers are available for managing internship information | ☐ | ☐ | | |
| Reliable internet connectivity is available | ☐ | ☐ | | |
| Staff regularly use computers for internship-related activities | ☐ | ☐ | | |
| Students have access to internet-enabled devices | ☐ | ☐ | | |
| Digital storage facilities are available for internship records | ☐ | ☐ | | |
| Existing systems support electronic document management | ☐ | ☐ | | |
| There is evidence of electronic communication with students | ☐ | ☐ | | |
| Security measures exist to protect internship information | ☐ | ☐ | | |
| User authentication mechanisms are currently used | ☐ | ☐ | | |
| Existing ICT infrastructure can support a web-based system | ☐ | ☐ | | |

SECTION 5: SYSTEM DESIGN AND FUNCTIONAL REQUIREMENTS

| Observation Item | Yes | No | Rating (1–5) | Remarks |
|---|---|---|---|---|
| Users require quick access to internship information | ☐ | ☐ | | |
| Users frequently search for internship opportunities | ☐ | ☐ | | |
| Search and filtering capabilities would improve access to information | ☐ | ☐ | | |
| Real-time updates of internship opportunities are necessary | ☐ | ☐ | | |
| Online internship application functionality would be beneficial | ☐ | ☐ | | |
| Automated notifications would improve communication | ☐ | ☐ | | |
| Reporting functionality would support internship management | ☐ | ☐ | | |
| Mobile accessibility would enhance system usage | ☐ | ☐ | | |
| Different user categories require different access privileges | ☐ | ☐ | | |
| Dashboard-based monitoring would improve management efficiency | ☐ | ☐ | | |

**SECTION 6: GENERAL OBSERVATIONS**

1. Describe the current workflow for identifying, communicating, applying for, and managing internship opportunities:

.....

.....

2. Identify any major inefficiencies observed in the current internship management practices:

.....

.....

3. Describe how students interact with the current internship opportunities management process:

.....

.....

4. Describe how staff coordinate internship opportunities and placements:

.....

.....

5. Identify any technological gaps that may affect implementation of a web-based Internship Opportunities Information System:

.....

.....

6. Additional observations and recommendations:

.....

.....

## Appendix VI: Document Review Guide for the Proposed Internship Opportunities Information System for EASLIS

### Internship Policies, Guidelines, and Procedures

1) EASLIS Internship Guidelines
2) Internship Placement Records and Reports
3) Strategic Plans and Institutional Frameworks
4) EASLIS Strategic Plans
5) Internship Provider and Partnership Documentation
6) Academic and Professional Literature
7) ICT and Information Systems Documentation
8) Training and Capacity-Building Materials
9) Internal Communication and Administrative Records
10) Student Feedback and Internship Evaluation Records
11) Complaints, Challenges, and Incident Reports
12) Benchmarking and Best Practice Reports

## Appendix VII: Field Introduction Letter

**MAKERERE UNIVERSITY**

P.O.Box 7062 Kampala Uganda
**Email:** info@cis.mak.ac.ug
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**facebook:** makcocis

COLLEGE OF COMPUTING & INFORMATION SCIENCES
EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE (EASLIS)

17.06.2026
The Dean
East African School of Library and
Information Science.

Dear Sir/Madam

**RE: INTRODUCTION LETTER**

This is to introduce you to the following students who are pursuing a Bachelor of Library and Information science (BLIS) in Year III at the East African School of Library and Information Science under the College of Computing and Information Science, Makerere University.

1. Nimurungi Cynthia Georgina 23/U/15892/PS
2. Kasozi Wavamunno Brian 23/U/09179/PS
3. Najjemba Esther 23/U/13218/PS
4. Keinembabazi Comfort 23/U/09563/PS
5. Ankunda Laura 23/U/06239/PS

As part of their degree programme, they are entitled to carry out a project under the course: BLS 3227 Project. The title of their project is ***"An internship opportunities information system for the East African School of Library and information Science, Makerere University."***

The purpose of this communication is to request you to offer them the necessary assistance required.

Please note that all information provided to them will be used for academic purposes only.

Thank you.

Sincerely,

Dr. Alice Gitta Kutyamukama
**AG.HEAD OF DEPARTMENT**
**LIBRARY AND INFORMATION SCIENCE**

## Appendix VIII: Morgan and Krejcie Table

*Table for Determining Sample Size of a Known Population*

| N | S | N | S | N | S | N | S | N | S |
|---|---|---|---|---|---|---|---|---|---|
| 10 | 10 | 100 | 80 | 280 | 162 | 800 | 260 | 2800 | 338 |
| 15 | 14 | 110 | 86 | 290 | 165 | 850 | 265 | 3000 | 341 |
| 20 | 19 | 120 | 92 | 300 | 169 | 900 | 269 | 3500 | 346 |
| 25 | 24 | 130 | 97 | 320 | 175 | 950 | 274 | 4000 | 351 |
| 30 | 28 | 140 | 103 | 340 | 181 | 1000 | 278 | 4500 | 354 |
| 35 | 32 | 150 | 108 | 360 | 186 | 1100 | 285 | 5000 | 357 |
| 40 | 36 | 160 | 113 | 380 | 191 | 1200 | 291 | 6000 | 361 |
| 45 | 40 | 170 | 118 | 400 | 196 | 1300 | 297 | 7000 | 364 |
| 50 | 44 | 180 | 123 | 420 | 201 | 1400 | 302 | 8000 | 367 |
| 55 | 48 | 190 | 127 | 440 | 205 | 1500 | 306 | 9000 | 368 |
| 60 | 52 | 200 | 132 | 460 | 210 | 1600 | 310 | 10000 | 370 |
| 65 | 56 | 210 | 136 | 480 | 214 | 1700 | 313 | 15000 | 375 |
| 70 | 59 | 220 | 140 | 500 | 217 | 1800 | 317 | 20000 | 377 |
| 75 | 63 | 230 | 144 | 550 | 226 | 1900 | 320 | 30000 | 379 |
| 80 | 66 | 240 | 148 | 600 | 234 | 2000 | 322 | 40000 | 380 |
| 85 | 70 | 250 | 152 | 650 | 242 | 2200 | 327 | 50000 | 381 |
| 90 | 73 | 260 | 155 | 700 | 248 | 2400 | 331 | 75000 | 382 |
| 95 | 76 | 270 | 159 | 750 | 254 | 2600 | 335 | 1000000 | 384 |

*Note: N is Population Size; S is Sample Size* *Source: Krejcie & Morgan, 1970*