A DATABASE-DRIVEN ACADEMIC RECORDS MANAGEMENT SYSTEM FOR KAKUNGULU MEMORIAL SECONDARY SCHOOL KIBULI.

BY

GROUP 34

NAME	STUDENT NUMBER	REG NUMBER
KISAKYE DEBORAH	23/U/10005/EVE	2300710005
DDAMULIRA DENIS	23/U/07973/EVE	2300707973
KATEREGGA DAVID	23/U/709249/PS	2300709249
KIZITO SHUKRAH BIDIN	23/U/10156/EVE	2300710156
NAKAZIBWE DOREEN	23/U/13644/EVE	2300713644

A PROJECT REPORT SUBMITTED TO THE EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF LIBRARY AND INFORMATION SCIENCE OF MAKERERE UNIVERSITY

JUNE 2026

DECLARATION

We declare that this project report entitled "A Database-Driven Academic Records Management System for Kakungulu Memorial Secondary School Kibuli" was done by us and it's an authentic work carried out under the guidance and supervision Mr. Batte Richard. The matter embodied in this report has never been submitted earlier for the award of any degree or diploma to any University or higher institution of learning to the best of our knowledge.

NAME	REGNO	SIGNATURE	DATE
KISAKYE DEBORAH	23/U/10005/EVE		13/07/2026
DDAMULIRA DENIS	23/U/07973/EVE		13/07/2026
KATEREGGA DAVID	23/U/709249/PS		13/07/2026
KIZITO SHUKRAH BIDIN	23/U/10156/EVE		13/07/2026
NAKAZIBWE DOREEN	23/U/13644/EVE		13/07/2026

APPROVAL

This report is forward for examination under my supervision.

Signed …….. Date…27/7/26……

Mr. Batte Richard,

Department of Library and Information Science

East African School of Library and Information Sciences

Makerere University

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 specifically East African School of Library and Information Sciences. May the Almighty 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 fulfill 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 our entire program study.

We acknowledge with thanks the role played by our project supervisor Mr. Batte Richard for his untiring guidance and support throughout the entire project course. We also do wish to thank all the academic staff of the East African School of Library and Information Science and the College of Computing and Information Science and Makerere University at large.

Our great thanks go to the entire management, staff and administration at Kakungulu Memorial Secondary School Kibuli who answered all questions pertaining to this research and provided materials that were of informational value to this project.

May the God almighty bless you all.

TABLE OF CONTENTS

DECLARATION i
APPROVAL ii
DEDICATION iii
ACKNOWLEDGEMENT iv
TABLE OF CONTENTS v
EXECUTIVE SUMMARY viii
LIST OF TABLES x
LIST OF FIGURES xi
LIST OF ACRONYMS AND ABBREVIATIONS xii
ABSTRACT xiii
CHAPTER ONE 1
1.0 Introduction 1
1.1 Background and Rationale 1
1.1.1 Conceptual Background 1
1.1.2 Institutional Background 1
1.2 Problem Statement 2
1.3 Project Objectives 3
1.3.1 Overall objective 3
1.3.2 Specific objectives: 3
1.4 Research Questions 4
1.5. Scope of the project 4
1.6 Significance of the Project 5
1.7 Definition of key terms 6
CHAPTER TWO: LITERATURE REVIEW 7
2.0 Introduction 7
2.1. Database-driven systems in Academic Environments 7
2.1.1. Opposing Views on Database-Driven Systems 8
2.2 State of Practice: Global Practices in the Design and Development of Academic Records Management Systems 9
2.2.1 Current Practices in Ugandan Secondary Schools 10
2.2.2 Limitations of Existing Academic Records Management Practices 10
2.2.3 Challenges in Designing and Implementing Database-Driven Systems 11
2.4 System Requirements Identification 12
2.5 System Design and Development 13
2.6 Research Gap 13

CHAPTER THREE: PROJECT METHODOLOGY 14
3.0 Introduction 14
3.1 Research Design 14
3.2 Project Approach 14
3.3 Area of Project 15
3.4 Project Population 15
3.5 Sample Size 16
3.5.1 Sampling techniques 17
3.6 Data Collection Methods 17
3.7 Data Collection Instruments 20
3.8 Data Analysis 21
3.9 Data Presentation 21
3.10 Data Quality Control 22
3.11 Ethical Considerations 23
3.12 System development 24
3.12.1 The Tools 26
3.13 Limitations 26
CHAPTER FOUR: PRESENTATION AND DISCUSSION OF FINDINGS 28
4.0 Introduction 28
4.1 Socio-demographic characteristics of the respondents 28
4.1.1 Response rate 28
4.1.2 Gender of respondents 29
4.1.3. Age of the respondents 30
4.2 Objective 1: To find out the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations. 31
4.2.1 Limitations of Existing Academic Records Management Practices at the school 32
4.3. Objective two: To identify requirements for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. 35
4.3.1 Functional Requirements 36
4.3.2 Non-Functional Requirements 38
4.3.1 System Requirements 39
4.4. Objective three:To design and develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. 42
4.4.1 System Design 42
4.4.2 Database Design 43
4.4.3 System Development Approach 43
4.4.4 Developed System Modules 43

4.5. Objective four: To test and validate the developed database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. 45

CHAPTER FIVE: A DATABASE-DRIVEN ACADEMIC RECORDS MANAGEMENT SYSTEM FOR KAKUNGULU SECONDARY SCHOOL KIBULI 49

5.0 Introduction 49

5.1 System Design 49

5.1.1 Use Case Diagram 49

5.1.2 System context Diagram (Level 0) 52

5.1.3 Process Modelling Using the Data Flow (Level 1) Diagram 54

5.1.4 Activity Diagram 57

5.1.5 Sequence Diagram 58

5.1.6 Entity Relationship Diagram 60

5.1.7 Logical Database design 61

5.2 System Implementation 66

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATION 81

6.1 Introduction 81

6.2 Summary 81

6.2.1 Existing Academic Records Management Practices and Their Limitations at Kakungulu Memorial Secondary School Kibuli 81

6.2.2 Requirements for Developing a Database-Driven Academic Records Management System 82

6.2.3 Design and Development of the Database-Driven Academic Records Management System 82

6.2.4 Testing and Validation of the Developed System 83

6.3 Conclusion 83

6.4 Recommendations 84

REFERENCES 87

APPENDICES 90

Annex 1: Semi-Structured Interview Guide for School Staff (Teachers & Administrators) 90

Annex 2: Semi-Structured Interview Guide for Parents and Students 92

Annex 3: Document review guide 95

Annex 4: Questionnaire 1: Users (Teachers & Administrative Staff) 96

Annex 5: Questionnaire 2: Students & Parents 100

Annex 6: Observation Checklist for Academic Records Management Practices 103

Appendix 7: Introduction Letter for the Project 106

Appendix 8: Morgan and Krejcie Table 107

EXECUTIVE SUMMARY

Kakungulu Memorial Secondary School Kibuli (KMSSK) manages a large volume of academic records including student registration information, attendance records, examination results, report cards, and other administrative data that are essential for supporting teaching, learning, and institutional decision-making. However, the school's existing records management practices relied heavily on manual procedures, paper-based documentation, and isolated spreadsheet applications. These approaches presented several challenges such as delayed retrieval of information, data inconsistencies, duplication of records, increased risk of loss or damage to records, limited data security, and difficulties in generating timely academic reports. These challenges affected the efficiency of academic administration and hindered effective monitoring of student performance.

The purpose of this project was to design and develop a Database-Driven Academic Records Management System (ARMS) for KMSSK to improve the management, accessibility, security, and utilization of academic records. The study was guided by four objectives: to examine the existing academic records management practices at KMSSK, to identify the challenges associated with the current practices, to determine the requirements for a database-driven academic records management system, and to design, develop, and validate the developed system.

A case study research design employing both qualitative and quantitative approaches was adopted. Data were collected using questionnaires, interviews, observation, and document review techniques. The study targeted key stakeholders including school administrators, teachers, students, and parents. Data obtained from respondents provided valuable insights into the limitations of the existing system and informed the specification of functional and non-functional requirements for the developed solution.

The findings revealed that the existing records management processes were characterized by inefficiencies in data storage, retrieval, updating, and reporting. Respondents indicated challenges such as delays in accessing student records, difficulties in tracking attendance and academic performance, inadequate security controls, and excessive dependence on manual processes. The study further established the need for a centralized digital platform capable of supporting student registration, attendance tracking, examination management, report generation, user management, parent access, and secure record storage.

Based on the identified requirements, a Database-Driven Academic Records Management System was designed and developed using a three-tier architecture comprising the presentation layer, application layer, and database layer. The system incorporated modules for user authentication, student management, attendance management, examination and grades management, report generation, parent access, and audit logging. The database was designed using a relational model to ensure efficient storage, retrieval, and management of academic data while maintaining data integrity and consistency.

System testing and validation were conducted to evaluate functionality, usability, reliability, and performance. The results demonstrated that the developed system effectively addressed the shortcomings of the existing records management practices. Users reported improved accessibility to academic records, faster report generation, enhanced data accuracy, better security controls, and increased operational efficiency. The system was found to be user-friendly, reliable, and capable of supporting the school's academic records management needs.

The study concludes that the implementation of a database-driven academic records management system can significantly improve the efficiency and effectiveness of academic records management at KMSSK. The developed system provides a centralized, secure, and scalable platform for managing academic information and supporting informed decision-making within the school.

The study recommends the adoption and full deployment of the system at KMSSK, continuous user training, regular system maintenance, and implementation of data backup procedures. Future enhancements may include integration with national examination databases such as UNEB, development of mobile applications, implementation of SMS and email notification services for parents, cloud-based deployment, and incorporation of advanced analytics for academic performance monitoring and decision support.

LIST OF TABLES

Table 1: Shows the Sample Size Determination 16
Table 2: Shows the developed system functional requirements 36
Table 3: Shows the Functional Requirements Implementation Mapping Matrix 37
Table 4: Shows the Non-Functional Requirements for the developed system 38
Table 5: Shows the Non-Functional Requirements Implementation Mapping Matrix 39
Table 6: Software Requirements 40
Table 7: Hardware requirements 41
Table 8: Shows the System Usability Testing Likert scale questions 46
Table 9: Shows the logical Database Design 61
Table 10: Shows the Requirement-to-Database design Mapping 64

LIST OF FIGURES

Figure 1 : Shows the response rate 29
Figure 2: Shows the gender distribution of the respondents 29
Figure 3: Shows the age range of the respondents 30
Figure 4: Shows the Existing academic records management practices at the school 32
Figure 5: Shows the system login page 41
Figure 6: Shows responses on the developed academic records management system ease of use from the system usability scale 47
Figure 7: Shows responses on the developed academic records management system use without assistance using the system usability scale 47
Figure 8: The System Base Use Case Diagram 50
Figure 9: Shows the system context diagram (Level 0) 52
Figure 10: Shows the System Data Flow-Level 1 Diagram 55
Figure 11: Shows the system activity diagram 58
Figure 12: Shows the system sequence diagram 59
Figure 13: Shows the Entity Relationship Diagram 60
Figure 14: Shows the system login form for school administration and other critical users 67
Figure 15: Shows successful login into the system and administrator dashboard 67
Figure 16: Shows the system users management page interface 68
Figure 17: Shows the system settings and management page interface 68
Figure 18: Shows the student records search and information management page interface 69
Figure 19: Shows the student report and academic history retrieval page 70
Figure 20: Shows the class registration and management page 70
Figure 21: Shows the class registration and management form page 71
Figure 22:Shows the subject registration and management page interface 71
Figure 23: Shows the teacher assignment management page interface 72
Figure 24:Shows the examination registration management page interface 73
Figure 25: Shows the examination registration page form 73
Figure 26:Shows the Teacher grade entry page for students 74
Figure 27: Shows the teacher attendance management page for students 74
Figure 28: Shows the student academic history and promotion page interface 75
Figure 29: Shows the system audit and activity monitoring page interface 76
Figure 30: Shows the parent management module page interface 77
Figure 31: Shows the teacher management module page 78
Figure 32:Shows the student report generation page interface 79
Figure 33: Shows the student report generation print view 79
Figure 34: Shows the student report print export to pdf feature 80

LIST OF ACRONYMS AND ABBREVIATIONS

IDE	**Integrated Development Environment**
ERD	**Entity Relationship Diagram**
DFD	**Data Flow Diagram**
KMSSK	**Kakungulu Memorial Secondary School**
CSS	**Cascading Style Sheets**
MySQL	**Hypertext Preprocessor**
ORM	**Object-Relational Mapping**
PHP	**Hypertext Preprocessor**
ARMS	**Academic Records Management Systems**
DBMS	**Database Management System**
RBMS	**Relational Database Management System**
ICT	**Information and Communication Technology**
API	**Application Programming Interface**
UX	**User Interface**
UI	**User Experience**
SIS	**Academic Records Management System**
LMS	**Database Management System**
CRUD	**Create, Read, Update and Delete**
UML	**Unified Modelling Language**
UNEB	**Relational Database Management System**

ABSTRACT

This project focused on the design and development of a Database-Driven Academic Records Management System (ARMS) for Kakungulu Memorial Secondary School Kibuli (KMSSK). The study was motivated by challenges associated with the existing academic records management practices, which relied heavily on paper-based records, spreadsheet applications, manual report compilation, and physical filing systems. These practices resulted in delayed access to information, data inconsistencies, excessive administrative workload, poor data security, and limited coordination among departments. The project was guided by four objectives: to examine existing academic records management practices and their limitations; to identify requirements for developing a database-driven academic records management system; to develop the database-driven academic records management system; and to test and validate the developed system. A mixed-methods case study approach was adopted. Data were collected through semi-structured interviews, questionnaires, observation, and document review involving administrators, teachers, students, and parents. A total sample of three hundred thirty-one (331) respondents was targeted, while eleven respondents successfully participated, yielding a response rate of 93.6% Findings revealed that the existing records management environment was fragmented and inefficient, leading to delays in records retrieval, increased risks of human error, weak data security, and difficulties in monitoring student performance. Stakeholders expressed the need for a centralized system capable of supporting student registration, attendance management, marks processing, report generation, role-based access control, parent access, and efficient records retrieval. The study also identified critical non-functional requirements including security, usability, scalability, reliability, maintainability, and performance. Based on these requirements, a centralized database-driven system was designed and developed using a three-tier architecture comprising presentation, application, and database layers. The system incorporated modules for student registration, attendance management, academic records processing, grade computation, report generation, user management, parent access, and audit logging. System testing and validation confirmed that the developed solution effectively improved records accessibility, data accuracy, security, and administrative efficiency. Usability testing indicated that the majority of users found the system easy to use and capable of supporting academic records management with minimal assistance. The developed system successfully addressed the limitations of the existing practices and provides a practical, reliable, and scalable solution for academic records management at KMSSK.

CHAPTER ONE

1.0 Introduction

This chapter encompasses the background to the study, statement of the problem, project aim, objectives, questions, scope, significance and the definitions of key terms.

The project involved the design and development of a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli to address the challenges associated with managing diverse student data, including transcripts, examination results, and administrative records.

1.1 Background and Rationale

1.1.1 Conceptual Background

Worldwide, educational bodies increasingly embrace database systems to overhaul records handling and elevate service quality. Institutions in North America and Europe, for instance, deploy integrated platforms yielding real-time access to transcripts and analytics, markedly boosting administrative efficacy (UNESCO, 2023). In Africa, Kenya and South Africa illustrate how resource-light digital databases mend archival shortfalls, yielding scalable fixes even under fiscal strain (African Development Bank, 2024).

In East Africa, secondary schools confront distinctive obstacles to academic records oversight which among others include poor infrastructure, uneven tech proficiency among staff, and slender budgets notwithstanding a surge in digital adoption. Uganda's recent pushes, including the Education Management Information System rollout, spotlight how databases can plug longstanding voids in student data management and stakeholder involvement (Ministry of Education and Sports Uganda, 2023). Such strides contend with continental drives to harness technology for schooling progress and economic uplift (African Union, 2022).

1.1.2 Institutional Background

In Uganda's evolving educational sector, secondary schools shoulder growing responsibilities amid rising enrolments and demands for accountability. Digital innovations now redefine administrative functions, particularly in handling student data, at institutions like Kakungulu Memorial Secondary School Kibuli, a well-regarded establishment in Kampala. Therefore, the imperative arose to develop a database-driven academic records management system which bolstered data integrity, retrieval speed, and decision-making support.

Kakungulu Memorial Secondary School Kibuli reflects many of the regional challenges associated with outdated record-keeping practices. These practices are commonly characterized by reliance on paper-based ledgers and manual filing systems for managing transcripts, attendance records, and examination results, methods that are susceptible to data loss, delays, and limited analytical efficiency.

Similarly, such shortcomings present challenges but also provide opportunities to improve and adopt modern record-keeping practices. Staff resistance to digital changes and limited Information and Communication Technology (ICT) infrastructure pose challenges to implementation, but they also create opportunities for targeted training and system improvements (Kataike et al., 2025). Byprioritizing capacity building, schools cultivate a culture of technology adoption and maximize a digital system's uptake (Mandizha, 2024).

The database-driven academic records management system at Kakungulu Memorial Secondary School Kibulitargeted these voids through a vigorous, intuitive digital hub for records capture, storage, and querying. This mirrors worldwide and East African digital tides, through providing a viable solution to archival woes (UNESCO, 2023).

It is thus upon this backdrop that the project sought to develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

1.2 Problem Statement

Despite increased advances in information technology designed to enhance administrative efficiency within education, many Ugandan secondary schools continue to depend upon manual methods for managing academic records, including transcribing results by hand, entering attendance in physical registers, and storing examination records in physical files (Muhammadet al., 2022).

As student numbers increase and regulatory requirements become more stringent, these outdated practices prove inadequate, giving rise to prolonged retrieval delays, frequent clerical errors, and compromised data reliability (Kataike et al., 2025).

Such manual shortcomings manifested plainly in the school's everyday operations. Administrative staff spend countless hours shifting through files for transcripts and enrolment records, while teachers and parents alike endure prolonged waits for essential verifications and updates which breed disruptions that impede teaching schedules and undermine service

standards. Such practices not only congest workflows but also jeopardize adherence to increasingly rigorous educational governance (Mandizha, 2024).

Paper-based records remain intrinsically susceptible to mistakes, obscure audit trails, and obstruct swift responses to queries on academic progress or admissions (Kataike et al., 2025). At Kakungulu Memorial Secondary School Kibuli, the lack of integrated digital channels and instant data retrieval fostered recurrent losses of transcripts, delay result publications, and rampant discrepancies in enrolment figures, issues that eroded parental confidence and tarnished the institution's standing for dependability.

The challenges intensify within Uganda's secondary education institutions although parents and authorities now demand rapid, transparent, and accessible academic records. Rival schools adopting databases gain clear advantage, in contrast with analogue reliance which limits remote access, thereby restricting reach and responsiveness (Ministry of Education and Sports Uganda, 2023).

To overcome these obstacles and remain competitive, Kakungulu Memorial Secondary School Kibuli required a decisive shift to a database-driven academic records management system. Moreover, it liberates personnel from physical and repetitive tasks, enabling focus upon core instructional duties and relationship nurturing (OECD, 2023).

The project undertook todevelop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli's operational context and needs.

1.3 Project Objectives

1.3.1 Overall objective

The overall objective of the project was to develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

1.3.2 Specific objectives:

The project was guided by the following objectives.

1) To find out the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations.
2) To identify requirements for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.
3) To develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

4) To test and validate the developed database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

1.4 Research Questions

This project sought to answer the following research questions:

1) What are the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations?
2) What are the technical, operational, and user requirements for developing a database-driven academic records management system at KMSSK?
3) How can a database-driven academic records management system at KMSSK be designed and developed?
4) How effective is the developed database-driven academic records management system for KMSSK?

1.5. Scope of the project

Contextual Scope

The scope of this project encompassed all activities necessary to achieve the stated aim and objectives, which included the assessment of the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations, identification of requirements for database-driven academic records management system for KMSSK, design and development of database-driven academic records management system for KMSSK as well as testing and validation of the developed database-driven academic records management system for KMSSK.

Geographical scope

The project was conducted at Kakungulu Memorial Secondary School Kibuli located in Makindye Division,Prince Badru Kakungulu Road, Kampala City.

Time scope

The project spanned four months from March to June,2026.This period covered all phases of the system development process, including analysis, design, development, testing, and implementation.

1.6 Significance of the Project

The significance of this project resided in its capacity to redress deficiencies in academic records stewardship at Kakungulu Memorial Secondary School Kibuli. Amid mounting calls for data-centric education governance, a robust database-driven system emerges as indispensable for perpetuating seamless administration and stakeholder contentment (Mandizha, 2024). By replacing manual archiving with a computerized database system, the project improved the accuracy, accessibility, and security of student records while enhancing administrative efficiency in the school. This aligns with the increasing adoption of ICT-based information management systems in educational institutions to streamline record management and support effective decision-making processes (Kyoshabire et al., 2023; Ampaire et al., 2025).

Furthermore, this project positions KMSSK as a leader in Uganda's secondary education arena, by embracing digital technology to improve operational capacity and systematic academic records management. Database platforms now ubiquitous across sectors afford economical, intuitive means to curate real-time student data, thereby underpinning evidence-based choices (Laudon and Laudon, 2023). Through scrutiny of enrolment trajectories, performance metrics, and compliance logs, administrators can pinpoint remedial needs, hone resource deployment, and amplify instructional impact (Kataike et al., 2025).

Beyond its locality, the project enrichened Library and Information Science scholarship by furnishing tangible proof of database efficacy in scholastic contexts. Parallels from public sector digitization underscore how such systems elevate data interplay and retrieval fidelity. This blueprint offers a transferable archetype for fellow Ugandan schools pursuing analogous upgrades in records governance.

In resource-scarce environment particularly, where paper trails falter under volume and volatility, this database solution prevents barriers like clerical overload and archival decay. Mobile-accessible interfaces ensure equity for dispersed users, parents, educators, inspectors alike sidestepping literacy hurdles inherent in analogue regimes (African Development Bank, 2024). Ultimately, the project's outcomes not only fortify KMSSK academic records management service ethos but also strengthen resilient educational administration.

1.7 Definition of key terms

1) Database-Driven System

   A database-driven system constitutes an integrated information architecture wherein a central database serves as the repository for structured data, interfaced with applications for input, query, and output operations. It affords real-time data manipulation and scalability, pivotal for academic environments demanding secure, concurrent access to student particulars (Laudon and Laudon, 2023).

2) Academic Records

   Academic records denote the comprehensive compilation of a student's scholastic journey, encompassing certificates, examination marks, attendance registers, disciplinary notations, and enrolment particulars. These documents underpin institutional accountability and learner progression tracking, necessitating rigorous preservation and retrieval protocols (Penn and Pennix, 2017).

3) Records Management System

   A records management system comprises a systematic framework frequently digitized for the lifecycle oversight of records, from inception through active usage, archival, to disposal. In scholastic settings, it automates cataloguing, safeguards integrity against loss or tampering, and facilitates compliance with regulatory mandates (Mukred and Yusof, 2020).

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

A literature review is a type of academic writing that provides an overview of existing knowledge in a particular field of research. A good literature review summarizes, analyses, evaluates and synthesizes the relevant literature within a particular field of research (Chigbu et al., 2023).

This chapter delivers a rigorous critical review of scholarly literature and empirical studies on academic records management systems, database technologies, data integrity in educational settings, and usability evaluation frameworks.

The review systematically evaluated the efficacy of relational database models versus legacy paper-based systems, scrutinizes design and development barriers in developing-country schools, and exposes critical research gaps particularly the absence of localized, scalable solutions for secondary and tertiary education institutions. (SSRN, 2025).

The escalating demand for efficient educational administration in secondary schools has intensified the need for efficient academic records management systems, highlighting the critical role of innovative database-driven solutions in streamlining data handling and decision-making processes. This project centered on the development of a database-driven academic records management system, targeting persistent challenges in manual record-keeping such as data inaccuracies, retrieval delays, and security vulnerabilities.

2.1. Database-driven systems in Academic Environments

The transition from manual to database-driven processes represents a critical evolution in educational administration, propelled by the well-documented inefficiencies of traditional paper-based academic records management (Laudon and Laudon, 2022). Secondary schools across Uganda, continue to rely heavily on physical registers, handwritten ledgers, and filing cabinets for student enrollment, grade recording, attendance tracking, and examination result management (Kataike et.al, 2025). These legacy methods consistently produce operational bottlenecks, including prolonged record retrieval times, transcription errors, duplication of records, and vulnerability to loss or damage caused by fire, moisture, pests, and other environmental factors. Such challenges negatively affect the efficiency, accessibility, and reliability of school records management systems (Kyoshabire, Bahati, & Kintu, 2023; Ouma & Namusonge, 2022).

An empirical study indicates that reliance on manual and paper-based academic records management systems constrains efficiency, accessibility, timely retrieval of information, and decision-making in higher education institutions, making them increasingly inadequate for meeting contemporary educational and administrative demands (Angela, 2026). These inefficiencies compound in high-enrollment environments and schools, where daily administrative demands encompassing across multiple streams render manual processing unsustainable (Opiro, 2024).

The vulnerabilities extend beyond speed to fundamental data integrity issues. Manual systems lack audit trails, enabling unauthorized alterations that undermine examination integrity (Kyoshabire et al., 2023). Moreover, the absence of real-time access prevents timely interventions; teachers cannot instantly access historical performance patterns and assessment to customize instruction, while parents remain disconnected from progress monitoring (Kumar, Singh, and Shankar, 2022). In resource-constrained settings, reliance on paper-based records management systems places considerable pressure on institutional storage facilities and administrative resources. Studies have shown that the absence of purpose-built records centres and continued dependence on physical records create storage challenges, constrain access to information, and reduce operational efficiency, thereby highlighting the need for digital records management solutions (Katekwe & Mutsagondo, 2017; Obaro & Obaro, 2016).

A critical contextual gap emerges in Ugandan secondary education literature as international study documents Student Information System (SIS) successes such as significant retrieval time reduction at India's Vidyalaya schools localized implementations remain scarce (Vidyalaya, 2022). Existing Ugandan pilots, such as School Monitor’s deployment at some Kampala schools, demonstrate feasibility but exclude comprehensive curriculum integration for UNEB assessments, leaving education institutions without scalable blueprints (School Monitor, 2024). This represents the precise research void this project addresses.

2.1.1. Opposing Views on Database-Driven Systems

While relational database management systems (RDBMS) like MySQL are synonymous with transformative efficiency, counterarguments highlight implementation barriers in developing-world schools. Critics contend that staff digital literacy gaps averaging a significant proficiency among East African secondary educators necessitate extensive training investments, potentially offsetting initial cost savings (Ngugi and Kamau, 2020). Alter (2017)

cautions that poorly implemented systems risk creating "digital ledgers" more complex than their manual predecessors, citing a higher error increase during Kenya's initial Student Information System(SIS) rollout due to inadequate user training.

Proponents counter with compelling empirical evidence. The VMeduLife system, deployed largely in Indian secondary institutions, achieved a higher data accuracy through automated validation protocols, directly addressing manual systems' transcription failures (VMeduLife, 2025). These benefits extend to decision-making; real-time dashboards enable principals to monitor attendance trends and at-risk performance instantly, facilitating data-driven interventions absent in paper paradigms (SSRN, 2025).

The literature reveals a clear pattern: although initial implementation costs and staff training requirements pose challenges, the efficiency gains associated with database systems, coupled with the increasing integration and adoption of ICT in Ugandan secondary schools, make such systems both practical and essential for effective school management and administration (Ampaire et al., 2025; Kyoshabire et al., 2023)

2.2 State of Practice: Global Practices in the Design and Development of Academic Records Management Systems

Database-driven academic records management systems (ARMS) are structured digital platforms designed to collect, store, process, and retrieve student-related data efficiently within educational institutions. These systems are typically built using relational database technologies integrated with user interfaces that support data entry, reporting, and secure access (Elmasri and Navathe, 2016).

Globally, educational institutions have increasingly adopted database-driven systems to manage academic records due to their ability to enhance data accuracy, accessibility, and security. According to Laudon and Laudon (2022), modern information systems in education environments are designed using centralized databases that allow multiple users to interact with real-time data while maintaining data integrity and consistency.

Similarly, UNESCO (2021) highlights that digital education management systems improve administrative efficiency by automating processes such as student registration, grading, and report generation. These systems also support decision-making by providing timely and accurate data to administrators.

A widely implemented example is student information systems used in institutions across Europe and North America, which integrate databases with web-based interfaces to enable

role-based access for administrators, teachers, students, and parents. Such systems demonstrate how database-driven solutions enhance operational efficiency, transparency, and scalability in academic environments (OECD, 2022).

2.2.1 Current Practices in Ugandan Secondary Schools

In Uganda, many secondary schools, particularly private and semi-government institutions, still rely heavily on manual or semi-digital systems for managing academic records. These include paper-based registers, report cards, and basic spreadsheet applications such as Microsoft Excel for storing student data.

The Uganda Ministry of Education and Sports (2022) reports that while efforts have been made to introduce Information and Communication Technology (ICT) in schools, adoption of fully integrated database systems remains limited due to infrastructural and financial constraints.

Evidence from the Uganda Communications Commission (2023) indicates that although internet penetration has improved, many schools lack the technical capacity and resources required to implement and maintain robust database-driven systems. As a result, record management processes remain fragmented and inefficient

2.2.2 Limitations of Existing Academic Records Management Practices

Existing manual and semi-digital systems present several challenges in the management of academic records. First, manual systems are prone to errors such as incorrect data entry, duplication, and loss of records. According to Heizer, Render, and Munson (2020), manual data handling increases the likelihood of inconsistencies, especially in environments with large volumes of data.

Second, the use of non-integrated tools such as spreadsheets limits data sharing and coordination across departments. This often results in delays in report generation and difficulties in tracking student performance over time (Laudon and Laudon, 2022).

Third, manual and fragmented systems increase administrative workload. Teachers and administrators spend considerable time compiling reports, calculating results, and verifying records, which reduces efficiency and productivity (UNESCO, 2021).

Additionally, the absence of centralized and secure databases exposes academic records to risks such as data loss, unauthorized access, and lack of backup mechanisms. The World

Bank (2021) identifies poor data management practices as a key barrier to accountability and effective service delivery in developing countries.

2.2.3 Challenges in Designing and Implementing Database-Driven Systems

Despite the advantages of database-driven systems, several challenges affect their design and implementation in school environments. The World Bank (2023) identifies key barriers including limited funding, inadequate ICT infrastructure, and lack of skilled personnel.

Similarly, the International Telecommunication Union (2022) notes that digital literacy gaps among users, particularly teachers and administrative staff, can hinder effective system adoption and utilization.

Resistance to change is another significant challenge, as stakeholders accustomed to manual systems may be reluctant to transition to digital platforms. Additionally, issues related to data security, system maintenance, and sustainability must be carefully addressed during system design (Laudon and Laudon, 2022).

These challenges underscore the need for a system that is cost-effective, easy to use, secure, and adaptable to the specific needs and constraints of the school environment.

2.3 State of the Art: Emerging Trends in Database-Driven Systems in Schools

Database-driven academic records systems have advanced significantly, shifting from standalone desktop applications to integrated cloud platforms with enhanced analytics and automation capabilities (Yidana and Akuna, 2025). Contemporary systems leverage relational database management systems (RDBMS) such as MySQL and Oracle to store structured student data, enabling efficient querying and reporting (Yidana and Akuna, 2025).

Cloud-based deployment emerges as the dominant architecture, facilitating scalability and remote access. Power School SIS, one of the leading academic driven database platforms, integrates with Learning Management Systems (LMS) and assessment tools, providing real-time dashboards for attendance, grades, and compliance reporting across thousands of schools worldwide (Power School, 2025). Artificial intelligence integration represents the cutting-edge AI-powered classification which automatically tags records, while machine learning predicts student performance trends from historical data, transforming passive storage into strategic decision support (Access Corp, 2024).

API interoperability enables seamless data exchange between Student Information Systems (SIS), financial modules, and national examination boards. Skolera's cloud SIS, deployed

across African schools, automates enrollment-to-graduation workflows with mobile parent portals, reducing administrative processing (Skolera,2025). These developments directly address manual systems' core weaknesses slow retrieval, error-prone entry, and limited analytics establishing database-driven platforms as the standard for 21st-century school administration.

2.4 System Requirements Identification

The successful deployment of a database-driven ARMS depends on a systematic requirements identification process that establishes a foundation for system design, development, testing, and stakeholder alignment. Requirements elicitation and analysis enable developers to understand user needs, define system functionalities, and ensure that the resulting solution addresses organizational objectives effectively (Sommerville, 2016; Pressman & Maxim, 2020).This foundational phase categorizes requirements into functional specifying system capabilities and non-functional defining performance attributes ensuring comprehensive coverage of user and operational imperatives. For secondary school contexts, rigorous elicitation through stakeholder interviews, workflow analysis, and prototyping mitigate misalignment risks documented in failed educational Information Technology implementations (Kataike et al, 2025).

Functional Requirements

Functional requirements describe the specific operations and services that the system must provide. These requirements define how users interact with the system and the processes it supports (de Brock, 2023). These should depict core operations including student enrollment processing, attendance automation, grade entry and computation, examination result generation aligned with Uganda National Examinations Board (UNEB) formats, and report card production. Additional mandates include role-based dashboards and query functions for historical trends.

Non-Functional Requirements

Non-functional requirements govern system qualities such as usability in form of intuitive interfaces, security, performance, scalability, reliability, and maintainability (Abdullahi, 2010).

2.5System Design and Development

System design and development transform validated requirements into operational information systems through structured architectural, development, integration, and implementation phases that guide the translation of stakeholder needs into functional solutions (Sommerville, 2016). This critical translation encompassed database schema definition, user interface wireframes, module interdependencies, and deployment topologies tailored to secondary school operational realities.

ARMS are typically designed using modular architectures that separate key functional components such as student information management, academic records management, attendance tracking, user administration, and reporting modules. This modular approach enhances scalability, maintainability, system integration, and operational efficiency (Pressman & Maxim, 2020; Sommerville, 2016).

Academic institutions require parallel capabilities plus class scheduling integration and extracurricular tracking, mandating extensible Entity-Relationship Diagrams accommodating future boarding house and career guidance expansions (Ampaire et al., 2025; Kyoshabire et al., 2023).

Traditional Waterfall methodology, though well-structured, shows significant failure rates in educational Information Technology projects because it cannot easily adapt to changing needs (Kataike et al., 2025).

2.6 Research Gap

Despite substantial progress in database-driven educational technologies, a critical deficiency persists in context-specific research addressing the design and development of database-driven academic records management systems (ARMS) for academic institutions in developing countries Existing studies have largely concentrated on records management practices in universities, public institutions, and government-aided schools, leaving limited empirical evidence regarding the unique scalability challenges, infrastructural constraints, and curriculum management requirements faced by high-enrollment private secondary schools that simultaneously manage Ordinary Level and Advanced Level student records (Kyoshabire et al., 2023; Ampaire et.al., 2025).

CHAPTER THREE: PROJECT METHODOLOGY

3.0 Introduction

This section presents the methodology that guided the design and development of the database-driven academic records management system for KMSSK. It presents research design, project area, and target population for the project, as well as the sampling techniques that were used to obtain a representative sample for the project.

It further describes the data collection methods and instruments that were used in this project, and the procedures for data analysis and quality assurance. It also explains the approach to system design, including system architecture and data modelling, together with the processes of system implementation, testing, and validation for the developed system.

Finally, ethical considerations and limitations of the project are also discussed.

3.1 Research Design

The project adopted a case study research design to investigate the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli which informed the development of a database-driven academic records management system for the school.

A case study research design involves an in-depth investigation of a particular real-life setting or Organisation to understand a specific phenomenon within its actual context (Yin, 2014). In this project, the case study approach was appropriate because it enabled a detailed examination of how academic records were being managed at KMSSK.

3.2 Project Approach

The project adopted a mixed-methods research approach integrated with a modular design architecture that guided the development of the database-driven academic records management system for KMSSK. Modular design approach refers to a structured software engineering approach in which a system is decomposed into smaller, self-contained components or modules, each responsible for a specific function. A mixed-methods approach involves the systematic integration of both qualitative and quantitative techniques to ensure a comprehensive understanding of a problem and to support both analysis and system design decisions (Creswell and Plano Clark, 2017).

The qualitative component explored and understood the existing academic records management practices, challenges, and user needs of students, teachers, and school

administration at KMSSK. This involved collecting descriptive data on how information was being managed, the limitations of manual systems, and user expectations for improvement. The quantitative component supported the measurement of system requirements and evaluation outcomes, such as frequency of data use, transaction volumes, and user response patterns, which help in defining system specifications and validating performance.

3.3 Area of Project

The project was conducted at Kakungulu Memorial Secondary School Kibuli located in Makindye Division, Prince Badru Kakungulu Road, Kampala City.

3.4 Project Population

A study population refers to the entire group of individuals, objects, or entities relevant to a particular project, serving as the source from which samples are selected for empirical investigation (Creswell and Creswell, 2018).

According to information obtained through preliminary engagement with the school administration, the school has a total population of approximately one thousand two hundred ten (1,210) students, supported by thirty (30) teaching staff and seven (7) administrative personnel(Kakungulu Memorial Secondary School Kibuli Administration, 2026).Then for parents because they are not usually part of the school environment they were contacted and accessed through the help of school administrators and therefore a total of five (5) parents were used as respondents in the project. The total study population was therefore **one thousand two hundred fifty participants (1,252).**

The primary participants of this project were grouped into four categories, namely; students, teachers, parents and school administration as explained below;

Students, who form the majority of school population and provided feedback on accessing academic records, results, and timetables through the system.

Teachers, who manage student assessments and grading, offered perspectives on data entry efficiency and reporting usability.

Administrative Staff (Headteacher, deputies, director of studies), who oversee academic records, examination processing, and compliance reporting.

Parents, who track student performance and attendance, provided insights on system accessibility and communication features.

3.5 Sample Size

The sample size for this study was determined using the Krejcie and Morgan (1970) sample size determination table, which provides a scientifically established method for selecting representative samples from finite populations. According to Krejcie and Morgan (1970), a population of 1,210 students requires a sample size of approximately 291 respondents, while a population of 30 teaching requires a sample size of 28 respondents. (See appendix 8, p.118)

The Krejcie and Morgan table was applied to the student and teacher populations because they constituted large and accessible groups from which representative samples were drawn. However, the administrative personnel were not subjected to the Krejcie and Morgan procedure because of their small population size. Instead, all seven (7) administrators were included in the study through census sampling to ensure that all key decision-makers and custodians of academic records were represented.

Similarly, parents were not subjected to the Krejcie and Morgan sample determination procedure because they did not constitute a readily accessible school-based population. Rather, five (5) parents were purposively selected with the assistance of school administrators based on their availability and direct involvement in students' academic follow-up. Purposive sampling is appropriate where participants possess specific characteristics or experiences relevant to the study objectives (Patton, 2015; Nyimbili & Nyimbili, 2024).

The resulting sample size distribution is presented in the table below;

Table 1: Shows the Sample Size Determination

Category	Population (N)	Sampling Technique	Krejcie and Morgan Sample Size (S)	Actual Sample
Students	1,210	Simple random sampling	291	291
Teachers	30	Simple random sampling	28	28
Administrative personnel	7	Census sampling	Not applicable	7
Parents	5	Purposive sampling	Not applicable	5
Total	**1,252**			**331**

The five (5) parents were identified and accessed through the assistance of the school administration because parents are not ordinarily part of the day-to-day school environment. Therefore, the study utilized a total sample of **three hundred thirty-one (331) respondents** comprising 291 students, 28 teachers, 7 administrators, and 5 parents.

3.5.1Sampling techniques

The project employed a combination of purposive and snowball sampling techniques to select participants from the identified population.

Purposive sampling was used as the primary technique to intentionally select participants who possess relevant knowledge, experience, and involvement in academic records management processes. This method is appropriate for case study and mixed-methods research, where the focus is on obtaining rich, detailed, and context-specific information from information-rich participants (Patton, 2015). Through this approach, the research team identified key respondents such as teachers, administrative staff, and selected students who directly interact with academic records.

In addition, snowball sampling was employed to identify additional participants through referrals from initial respondents. This technique was particularly useful in situations where the research team needed to access participants with specific roles and insights that are not immediately identifiable at the outset of the project, especially parents. Participants were initially selected through purposive sampling which was used to recommend other individuals who have relevant experience with academic records processes.

The combination of purposive and snowball sampling were justified because they allowed the research team to first target key informants and then expand the sample through trusted networks, thereby enhancing the depth and relevance of the data collected.

3.6 Data Collection Methods

The project utilized both primary and secondary data collection methods to gather information for the research project. The primary data collection methods included interviews and questionnaires while the secondary data collection methods included reviewing existing documents and observation.

- **Structured Questionnaires**

Structured questionnaires were used as a quantitative data collection method to gather standardized information from a larger group of respondents. These questionnaires consisted mainly of closed-ended questions such as Likert scale items, multiple-choice questions, and ranking options, with a few open-ended questions included to allow for additional clarification (Creswell and Creswell, 2018).

The questionnaires were administered to students, teachers, and parents who are directly involved in and affected by the academic records management system. This method facilitated the collection of measurable data on user needs, system usability challenges, and preferences for system features.

To ensure reliability and clarity, the questionnaire was pilot tested on a small group of respondents before full administration. Feedback from the pilot test was used to refine the instrument.

Data Collection Tool:

A structured questionnaire comprising both closed-ended and a few open-ended questions was used. (See Annex 4, p.106 and Annex 5, p.110)

- **Semi-Structured Interviews**

Semi-structured interviews were used as a qualitative data collection method. These interviews were guided by a set of pre-determined questions while allowing flexibility for further probing and exploration of emerging issues (Kallio et al., 2016). This approach enabled the research team to obtain in-depth insight into participants' experiences, perceptions, and expectations regarding the current academic records management practices.

Interviews were conducted face-to-face with purposively selected respondents from the key stakeholder groups within the school, namely administrators, teachers, students, and parents.

Administrators' interviews focused on institutional priorities, policy compliance, data security requirements, and challenges in overseeing academic records.

Teachers' interviews explored issues related to data entry, report generation, record accuracy, and challenges encountered in managing students' academic information.

Students' interviews captured user experiences in accessing academic records, challenges faced, and expectations for improved accessibility and transparency.

Parents' interviews examined their needs regarding access to students' academic performance, communication with the school, and expectations for timely and accurate information.

Open-ended questions were used to gather detailed information on the existing academic records management practices, inefficiencies, user requirements, and suggestions for improving academic records management.

Data Collection Tool:

An interview guide consisting of open-ended questions tailored to each stakeholder group were used. (See Annex 1, p.100 and Annex 2, p.102)

- **Observation Method**

The observation method involved the systematic recording of behaviors, interactions, and workflows of users within the school's administrative offices, classrooms, and records management units without direct interference (Guest, Namey, & Mitchell, 2013). This method enabled the research team to obtain first-hand information on how academic records are currently created, managed, and accessed.

Direct observation was conducted within the school setting to examine how administrators, teachers, and students interact with existing academic records systems and processes. The research team documented routine activities such as data entry, records storage, retrieval processes, and report generation.

Administrators' activities were observed to understand oversight practices, record approval procedures, and compliance requirements.

Teachers' activities focused on how academic data is recorded, updated, and reported.

Students' interactions were observed to assess how they access and utilize academic information where applicable.

Data Collection Tool:

An observation checklist was used to systematically record workflows, challenges, and information management practices.(see Annex 6, p.113)

- **Systematic Document Review**

Systematic document review involved a structured and organized process of identifying, evaluating, and interpreting existing records and documents relevant to the study. This method provided secondary data that complemented the primary data that was collected through interviews, questionnaires, and observation.

A comprehensive review of the school's academic records at KMSK was conducted. These documents included student registration records, class attendance registers, examination results, report cards, timetables, and policy guidelines related to academic records management.

The document review aimed to establish existing data management practices and record formats, identify gaps, inconsistencies, and inefficiencies in current record-keeping systems, validate and support findings obtained from primary data sources, provide historical and procedural context for academic records management within the school

Data Collection Tool:

A document analysis checklist was used to guide the extraction and recording of relevant information from the reviewed documents. (see Annex 3,p.105)

3.7 Data Collection Instruments

The primary data collection instruments included interview guides, structured questionnaires, observation checklists, and document analysis checklists. These instruments were designed to capture comprehensive information on the existing academic records management practices, challenges, and user requirements within KMSSK.

Interview Guides:

Interview guides were used to conduct semi-structured interviews with purposively selected respondents, including administrators, teachers, students, and parents. The guides consisted of open-ended questions tailored to each stakeholder group, which enabled the collection of detailed insights into experiences, challenges, and expectations regarding academic records management.(See Annex 1, p.92 and Annex 2, p.94)

Survey Questionnaires:

Structured questionnaires were administered to a broader group of participants, particularly students, teachers, and parents. These questionnaires included mainly closed-ended questions, such as Likert scale items and multiple-choice questions, along with a few open-ended questions for clarification. This instrument facilitated the collection of standardized data that was analyzed quantitatively to identify trends and patterns in user needs and system requirements.(See Annex 4, p.98 and Annex 5, p.102)

Observation Checklist:

An observation checklist was used during the observation process to systematically record workflows, user interactions, and data handling practices within the school. It helped capture real-time activities related to academic records management, including data entry, storage, retrieval, and reporting processes, thereby identifying inefficiencies and operational challenges. (see Annex 6, p.105)

Document Review Guide:

Document analysis involved reviewing existing school records such as student registration records, attendance registers, examination results, report cards, and relevant policy documents. A document analysis checklist was used to guide the systematic extraction of relevant information. This instrument helped identify current practices, gaps, and limitations in the existing records management system, which provided essential insights which informed the design of the system. (see Annex 3,p.97)

3.8 Data Analysis

To extract meaningful insights that informed the design of a contextually appropriate database-driven academic records management system, the collected data was analyzed using a structured yet adaptable approach.

Data analysis followed a mixed methods approach where qualitative data (from interviews, observations, and document review) and quantitative data (from questionnaires) were analyzed separately and later integrated during interpretation.

Findings from interviews were systematically cross-checked with observation data and document review findings to ensure consistency and validity of results. This process of comparing multiple data sources aligns with methodological triangulation, which enhances the credibility and reliability of research findings (Patton, 2015).

In addition, quantitative survey results were used to confirm and validate emerging qualitative themes, ensuring convergence of evidence across different data sources. Such triangulation strengthens the dependability of findings by reducing bias associated with a single method of data collection (Beckworth et al., 2016).

3.9 Data Presentation

Qualitative findings were presented using thematic narrative summaries, where key patterns, user experiences, and operational challenges were organized into coherent themes. Thematic

analysis guided the 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, and 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 systems research (Creswell and Creswell, 2018).

Triangulation was applied during data presentation by integrating findings from interviews, questionnaires, observations, and document analysis. For example, issues identified through questionnaires were cross verified with interview responses and further validated through direct observation of academic records management practices within the school.

This multi-source validation ensured convergence of evidence and improved the trustworthiness of findings by ensuring that conclusions were not based on a single data source but on corroborated evidence from multiple methods.

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

3.10 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.

To ensure data quality, several strategies were applied during the research process, including triangulation, accurate documentation, and systematic verification of data sources.

Audio-recorded interviews were transcribed verbatim with participants' consent to ensure accurate representation of responses. This process enhances dependability and conformability by preserving the original meaning and context of participants' views (Miles, Huberman, andSaldaña, 2014).

To ensure data quality, triangulation of data sources was applied by comparing findings from interviews, questionnaires, observations, and document analysis.

This approach enhanced the accuracy, consistency, and reliability of the data by identifying similarities and discrepancies across different methods, thereby improving overall validity. Triangulation is a key strategy in qualitative research for strengthening credibility (Patton, 2015)

3.11 Ethical Considerations

Ethical considerations are fundamental to conduct responsible research, which fosters trust, and also ensures the dignity and rights of all participants are respected throughout the study (Resnik, 2020).

Ethical Approval

Prior to data collection, formal ethical approval were sought from the East African School of Library and Information Science Research Ethics Committee. This approval process ensured that the project complied with institutional ethical standards and safeguarded participants from potential harm. It also validated that the project procedures met acceptable academic and professional research conduct requirements. (See appendix 7, p.108)

Informed Consent

Informed consent was obtained from all participants before their involvement in the project. Participants were clearly informed about the purpose of the project, 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 varied.

Consent was obtained either in written form or verbally, depending on participant's preference and context. Where verbal consent was used, it was recorded with permission. This process ensured that participation was voluntary and based on full understanding of the project, thereby respecting participant autonomy and reducing the risk of coercion (Wiles et al., 2021). Participants were also informed that they have the right to withdraw from the study

at any time without penalty, which upholds the principle of voluntary participation and non-maleficence (Orb, Eisenhauer, and Wynaden, 2021).

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.

Cultural Sensitivity and Access Permission

The project was conducted with full respect for the cultural, social, and operational norms of KMSSK. The research team observed appropriate protocols when engaging with participants to ensure respectful interaction within the school environment.

Prior to data collection, permission was obtained from school leadership and relevant administrative authorities within Kakungulu memorial secondary school. This ensures that the project is conducted with institutional awareness and community approval, thereby promoting cooperation, trust, and ethical access to participants and records (World Medical Association, 2013).

Intellectual Property and Academic Integrity

Intellectual property rights and academic integrity were strictly observed by appropriately citing all sources, materials, and data that was utilized in the project. Permission was secured for the use and reproduction of proprietary content, and contributions to the development of the database-driven academic records management system were formally acknowledged, reinforcing responsible scholarship and ethical collaboration (University of Sussex, 2023).

3.12System development

The following standardized technologies were employed in the development of the database-driven academic records management system to ensure efficiency, scalability, and cross-platform compatibility:

Backend Development

C# (Microsoft-based System Components)

C# was used for developing core Windows-based modules of the system. It provided strong object-oriented programming capabilities, high performance, and seamless integration with MySQL database, making it suitable for handling academic records processing, reporting, and administrative functionalities.

Microsoft Visual Studio 2015

Microsoft Visual Studio served as the primary integrated development environment (IDE) for designing, coding and debugging of the system components using programming languages namely; C#, PHP, Dart. It provided advanced development tools, debugging support, and database integration features that enhance productivity and system reliability.

Laravel – An open-source PHP framework was used to build a robust and maintainable backend system. Laravel provides powerful features for secure authentication, database management, and RESTful API integration, ensuring seamless data processing and system reliability.

PHP – A server-side scripting language known for its simplicity, flexibility, and compatibility with various databases such as MySQL, Maria DB and operating systems. It was used to handle server logic, database interactions, and dynamic content generation.

MySQL: For database management, MySQL was selected due to its reliability, performance, and widespread adoption in web-based applications. MySQL provides robust data storage, efficient query processing, and strong support for multi-user environments, making it suitable for managing the academic records of Kakungulu Memorial Secondary School Kibuli. The database was integrated to securely store and manage student information, academic records, user authentication data, and system logs while ensuring data integrity, efficient retrieval of records, and seamless compatibility with Laravel's Eloquent Object-Relational Mapping framework.

Frontend & Cross-Platform System Development

Flutter – A Google-developed UI toolkit used to create a consistent, high-performance system performance from a single codebase. Flutter facilitates a responsive and user-friendly interface for students, academic staff, and administrators, enabling efficient access, retrieval, and management of academic records across multiple devices while maintaining a consistent user experience.

Dart – The programming language used in the development of the Academic Records Management System through the Flutter framework. Dart was selected because of its fast compilation capabilities, high performance, and support for developing responsive and scalable applications. Its object-oriented features and ease of maintenance make it suitable for building a reliable system that facilitates efficient management, retrieval, and dissemination of academic records across web and mobile platforms.

3.12.1 The Tools

The system was designed using visual studio code as the tool of choice due to its widespread support for many programming languages. It also supports very many extensions which when used is the entire coding process making it faster and more effective.

3.13 Limitations

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

Limited Depth of Knowledge: A limited depth of knowledge regarding certain advanced aspects of database-driven academic records management systems was initially present within the research team. To address this, an extensive review of current literature was undertaken, and consultations with subject matter experts were conducted to build a comprehensive understanding of the topic and inform the system design.

Participant Reluctance: Some participants exhibited reluctance to provide exhaustive answers to specific questions, particularly in questionnaires and 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 remained, the analysis transparently acknowledged these and relied on data from willing respondents and considered follow-up interviews to fill critical gaps.

Challenges in Software Customization: Challenges in software customization arose due to the inherent complexities of tailoring a system to specific organizational needs and, at times, limited prior experience with certain development frameworks. To overcome this, the allocated project timeline was used optimally to familiarize and learn relevant programming skills and open-source modules were utilized where appropriate to expedite the customization process.

Financial Constraints: Financial constraints restricted the scope of data collection and system development, particularly regarding access to premium tools and extensive training resources. To manage this, the project prioritized essential activities, 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 design a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. The objectives of the study were to; find out the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations; identify requirements for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli; design and develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli; To test and validate the developed database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

4.1 Socio-demographic characteristics of the respondents

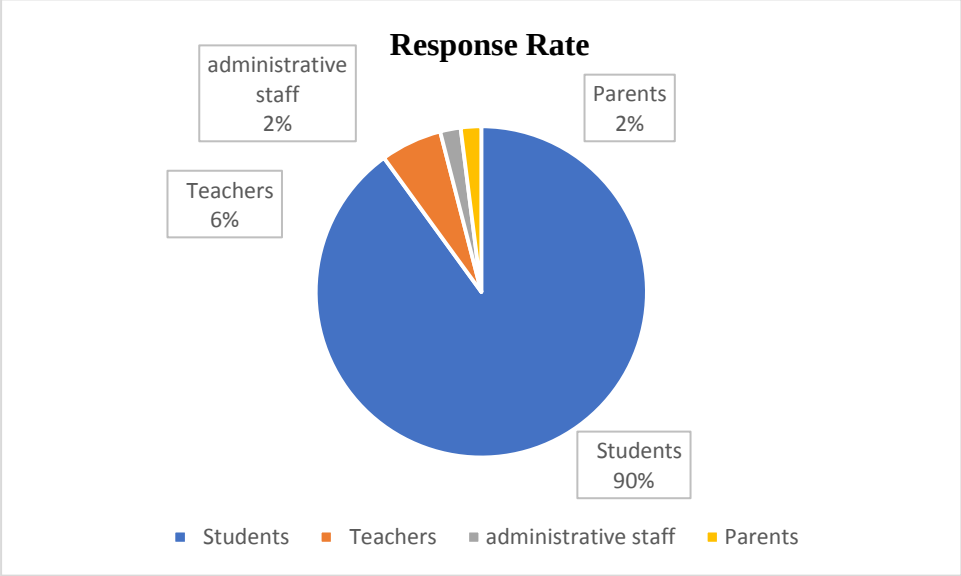
This section details the response rate, gender distribution, age of the respondents as well as need for the developed system and recommendations from the respondents who participated in the study.

4.1.1 Response rate

The project set out to sample three hundred thirty-one (331) respondents, but the number of respondents was slightly reduced. Of the three hundred thirty-one (331) respondents, two hundred ninety-one (291) were students, twenty-eight (28) were teachers, seven (7) were administrative staff and five (5) were parents. Out of the three hundred thirty-one (331) interviews expected, the study achieved 310 interviews hence resulting in a total response rate of 93.6%. The variation in response was due to concerns about the confidentiality of their responses, the sensitive nature of academic records managed, and the unavailability of some of the respondents, especially the staff as they were on leave. Although twenty-one (21) of the targeted respondents did not participate in the study, the non-response rate of 6.4% was relatively low and therefore unlikely to significantly affect the validity of the findings. Therefore, to minimize the potential effects of non-response bias, findings obtained from questionnaires were cross-checked with interviews, observations, and document review. This

triangulation enhanced the credibility of the findings and strengthened confidence in the conclusions drawn despite the slight shortfall in the intended sample size.

Figure 1 : Shows the response rate



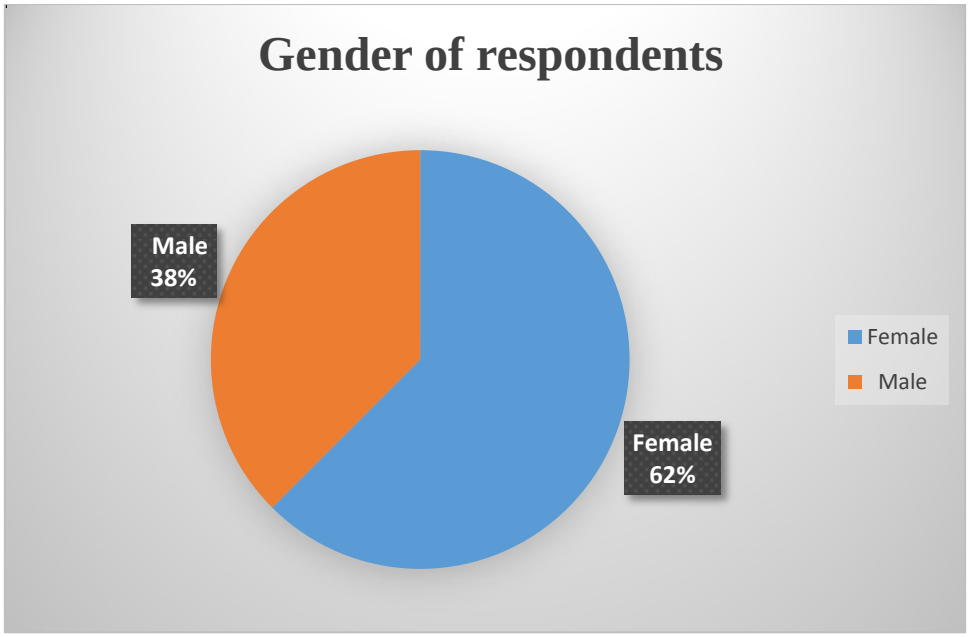
Source: Primary data, 2026

The results above show the response rate with Students as the highest at 90% followed by teachers with 6% followed by parents and teachers with 2% each as the lowest rate percentage.

4.1.2 Gender of respondents

Majorly, 62% of the respondents were female and 38% were male therefore, the female gender constituted the biggest population.

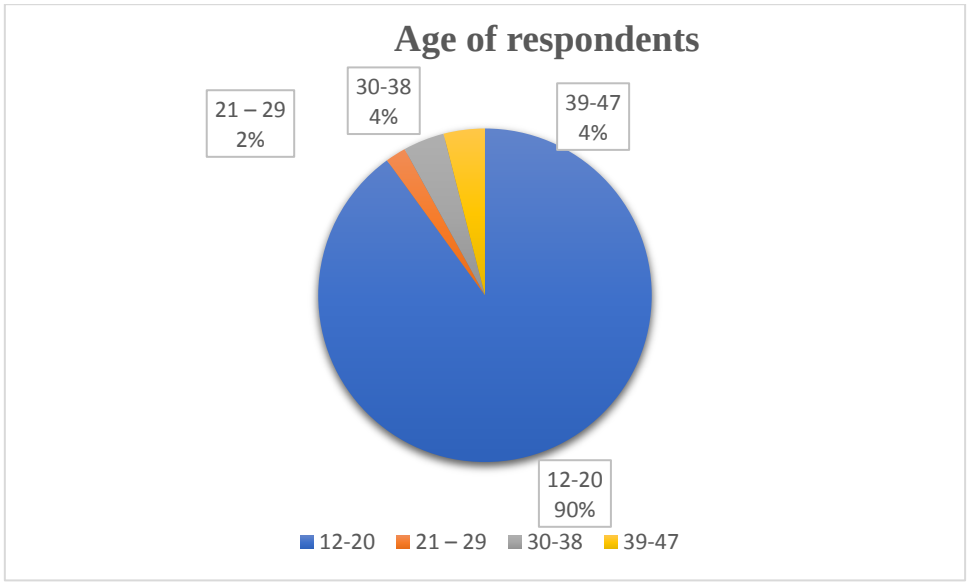
Figure 2: Shows the gender distribution of the respondents



Source: Primary data, 2026

4.1.3. Age of the respondents

Figure 3: 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 (12-20) having the highest number of respondents at 90% followed by the age groups of (30-38) and (39-47) both with 4% and lastly the age group of (21-29) with the lowest number of respondents at 2%.

4.2Objective 1: To find out the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations.

It was established that academic records at Kakungulu Memorial Secondary School Kibuli are currently managed through the following methods:

Paper-Based Record Keeping: Teachers record students' marks, attendance, and continuous assessment results in physical mark books, class registers, and report forms. These records are later submitted to the administration for compilation and storage.

Spreadsheet Applications: The examinations departments use spreadsheet software such as Microsoft Excel to calculate students' grades and prepare end-of-term reports. Individual teachers maintain separate files on personal computers and flash disks.

Manual Report Compilation: Examination results are manually compiled by class teachers and the Director of Studies before printing report cards for students.

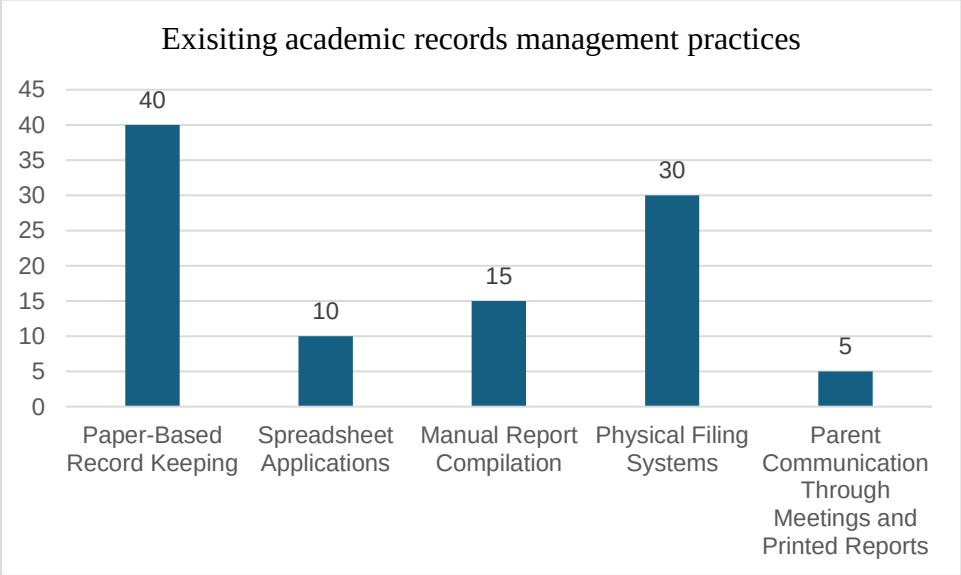
Physical Filing Systems: Student academic records, including past reports, examination scripts, and admission details, are stored in filing cabinets within administrative offices.

Parent Communication Through Meetings and Printed Reports: Parents receive updates on student performance mainly during visitation days, parent-teacher meetings, and through printed report cards issued at the end of each term.

These practices have been maintained over time because they are familiar to staff and require minimal technological infrastructure. A respondent indicated that manual systems are easy to understand and do not require advanced computer knowledge. As one teacher explained during the interviews:

> "Using mark books is something we are already used to. Every teacher knows how to record marks on paper, and it does not require special training."

Figure 4: Shows the Existing academic records management practices at the school



Source: Primary data, 2026

Based on the findings as shown in figure 4, paper-based record keeping is the most used academic records management practice with the highest percentage (40%), followed by physical filling systems (30%), then manual report compilation in the third place (15%), use of spreadsheet applications with (10%) in the fourth place and lastly parent communication through meetings and printed reports with (5%) being the least used academic records management practice.

4.2.1 Limitations of Existing Academic Records Management Practices at the school

The research team identified several limitations associated with the current academic records management practices at the school.

4.2.1.1 Limited Accessibility and Delayed Access to Information

Access to academic records is often slow and inconvenient because most records are maintained manually or stored on isolated computers. Students and parents cannot easily access results unless they physically visit the school or wait for official reporting periods.

One student explained:

> "Sometimes we wait for several weeks before getting our results because teachers must first compile everything manually."

A parent similarly expressed frustration regarding delays in obtaining academic updates. One parent remarked:

> "If you want to know how your child is performing before report day, it is difficult because the information is not readily available."

The findings are further supported by Al-Fraihat, D. et al. (2020), who observed that information systems significantly improve service delivery by enabling real-time access to institutional data, reducing delays associated with manual processing, and increasing user satisfaction

The implication of these findings is that continued reliance on manual academic records management limits transparency, delays academic decision-making, and weakens communication between the school and its stakeholders

4.2.1.2 High Risk of Errors and Data Inconsistencies

The manual recording and fragmented spreadsheet usage frequently lead to calculation mistakes, duplication of records, and inconsistencies in student data. Since different teachers maintain separate records, errors are often discovered late during report compilation.

As one teacher admitted:

> "Sometimes marks are entered wrongly in the mark books or spreadsheets, especially when handling many students at once."

An administrator further explained:

> "Because departments keep separate files, we occasionally find conflicting student records during end-of-term processing."

These findings are consistent with the assertion by Heizer, Render, and Munson (2020) that manual data handling increases the likelihood of inconsistencies and human error.

Excessive Administrative Workload

The project findings showed that teachers and administrators spend considerable time compiling results, calculating grades, and preparing reports manually. This increases workload and reduces the time available for teaching and other academic responsibilities.

One teacher reported:

> "Preparing report cards consumes a lot of time because we have to combine marks from different subjects manually."

Similarly, the Director of Studies noted:

> “During examination periods, staff work long hours verifying marks and correcting errors before reports are printed.”

The findings are consistent with a recent study which indicates that manual academic records management is highly susceptible to human error and data inconsistencies. According to UNESCO (2023), education institutions that rely on paper-based records and disconnected spreadsheets experience frequent inaccuracies arising from repetitive manual data entry, duplication of information, and the absence of automated validation mechanisms.

The implication of these findings is that persistent errors and inconsistencies compromise the reliability of students' academic records and reduce confidence in the school's assessment processes.

4.2.1.3 Poor Data Security and Risk of Record Loss

It was also found out that physical files and standalone spreadsheet records are vulnerable to loss, unauthorized access, and accidental damage. Respondents indicated that paper records can easily be misplaced, while computer files stored without centralized backup mechanisms are at risk of deletion or corruption.

One administrator explained:

> “If a file gets deleted from a computer or a paper report is misplaced, recovering that information becomes very difficult.”

A teacher also expressed concerns regarding storage limitations and record preservation. One teacher observed:

> “Some older student records are difficult to trace because files pile up over the years and storage space becomes limited.”

Similarly, World Bank (2023) observes that poor data governance remains a major obstacle to effective education management in many developing countries. The report emphasizes that centralized digital record management systems improve accountability by protecting educational data through structured storage, automated backups, disaster recovery mechanisms, and controlled user access

The implication of these findings is that inadequate data security threatens the integrity, confidentiality, and availability of students' academic records. Loss or corruption of academic

information may result in inaccurate transcripts, delayed certification, administrative disputes, and legal or regulatory challenges for the school.

4.2.1.4 Lack of Centralized Coordination

The project further established that the absence of an integrated academic records system creates coordination challenges among departments. Since records are managed independently, information sharing between teachers and administration is often delayed.

As one administrator explained:

> "We do not have one central system where all departments can access updated student records at the same time."

A teacher similarly noted:

> "Sometimes changes made in one department are not communicated immediately to others, which creates confusion during reporting."

Similarly, OECD (2023) reports that centralized educational information systems strengthen institutional governance by improving communication, coordination, and accountability across departments.

The implication of therefore is that poor coordination arising from fragmented records management undermines effective academic administration and institutional performance.

4.3. Objective two: To identify requirements for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

The requirements for the developed database-driven academic records management system were identified through a structured requirements elicitation process involving key stakeholders of Kakungulu Memorial Secondary School Kibuli. The study targeted administrators, teachers, records personnel, ICT staff, students, and parents who interact with academic records in different capacities. Participants were selected using appropriate sampling techniques based on their roles and involvement in the management, use and access of academic records within the school.

Data were collected using questionnaires, interviews, and observations to obtain comprehensive information regarding the existing academic records management practices and users' expectations for the developed system. Administrators and records personnel provided information on records creation, storage, retrieval, and reporting processes, while teachers, students, and parents shared their experiences regarding access to academic

information and the challenges encountered in the current records management practices. ICT personnel contributed technical requirements necessary for system development and implementation.

The data collected were analyzed to identify the system requirements needed to address the shortcomings of the existing records management practices

The analyzed findings from the project identified and indicated the requirements necessary for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. The requirements identified included both functional requirements describing what the system should accomplish and non-functional requirements describing the qualities and standards the system should maintain.

4.3.1 Functional Requirements

The functional requirements describe the specific services, operations, and activities that the developed database-driven academic records management system should perform to support academic records management at Kakungulu Memorial Secondary School Kibuli.

Table 2: Shows the developed system functional requirements

Functional Requirement	Stakeholder Rationale
Search and retrieval functionality	Facilitates quick access to student records and historical academic information when required.
Role-based access control	Ensures different users such as administrators, teachers, students, and parents access only information relevant to their responsibilities.
Automated marks entry and grade computation	Reduces calculation errors and saves time during examination processing and report preparation.
Parent access portal	Allows parents to monitor student academic progress, attendance, and school communication remotely.
Student registration module	Simplifies student enrolment and storage of biodata, class information, and academic history.
Report card generation	Allows automatic generation and printing of student report cards at the end of each term.
Attendance management	Enables teachers to record and monitor student attendance

Functional Requirement	Stakeholder Rationale
functionality	electronically for better tracking and reporting.
Performance audit and activity monitoring	Assists administrators in generating academic performance summaries, trends, and departmental reports for decision-making.

Source: Primary data, 2026

4.3.1.1 Functional Requirements Mapping

Table 3: Shows the Functional Requirements Implementation Mapping Matrix

Functional Requirement	System Module / Feature Implementation	Evidence (Figure Reference)
Search and retrieval functionality	Student Records Search & Academic History Module	See Figures 19 and 22 (Page 72 and Page75)
Role-based access control	Login Authentication & User Role Management Module	See Figures 14, 15 (Pages 69–70)
Automated marks entry and grade computation	Grade Entry & Examination Processing Module	See Figure 26 (Page 76)
Parent access portal	Parent Management Module	Figure 30 (Page 79)
Student registration module	Student Registration & Information Management Module	See Figure 18 (Page71)
Report card generation	Report Generation & Print Module	See Figures 32, 33, 34 (Pages 81–82)
Attendance management functionality	Attendance Management Module	See Figure 27 (Page 76)
Performance audit and activity monitoring	System Performance audit and activity monitoring module	See Figure 29 (Page 78)

Source: Primary data, 2026

4.3.2 Non-Functional Requirements

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

Table 4: Shows the Non-Functional Requirements for the developed system

Non-Functional Requirement	Stakeholder Rationale
User-friendly interface	Ensures that users with limited technical skills can easily navigate and use the system effectively.
Secure authentication system	Ensures confidentiality and protection of student academic information from unauthorized access.
Centralized MySQL/PHP database-driven backend	Provides a secure and centralized environment for storing and managing student academic records.
Performance	Ensures the system loads quickly and handles multiple simultaneous users without performance degradation.
Usability	Provides intuitive design and navigation to enhance user experience and minimize the learning curve for users.
Reliability	Ensures the system remains available and functions consistently with minimal downtime.
Maintainability	Enables easy modification, upgrading, and troubleshooting of the system when necessary.
Scalability	Allows the system to accommodate increasing numbers of users and records as the school grows.

Source: Primary data, 2026

4.3.2.1 Non-Functional Requirements Implementation Mapping Matrix

Table 5: Shows the Non-Functional Requirements Implementation Mapping Matrix

Non-Functional Requirement	System Implementation Evidence	Figure Reference
User-friendly interface	Dashboard UI and module interfaces	See Figures 15, 18, p.70-71
Secure authentication system	Login system with role-based access control	See Figures 14, 15,p.69-70.
Performance	System responsiveness during data entry and retrieval	See Figures 26 ,p.76
Usability	Interface design across modules	Figures 16–34, p.70-82
Reliability	Stable system operation across modules	Figures 16–34, p.70-82

Source: Primary data, 2026

4.3.1 System Requirements

The system requires various hardware and software so that it is compatible with a variety of computers and runs smoothly without any errors. Therefore, findings from the project indicated the software and hardware requirements as shown below;

4.3.1.1 Software Requirements

Table 6: Software Requirements

Software	Specification	Justification
Operating System	Windows 10 or Windows 11	This provides a stable and user-friendly environment for developing, testing, and deploying the academic records management system. These operating systems support the required development tools, database management systems, and web technologies while offering enhanced security features and compatibility with modern hardware.
Programming Languages	C#, PHP, Dart	C# is used for Windows-based modules, PHP for Laravel backend logic, and Dart for Flutter mobile application development.
Database Management System (DBMS)	MySQL	This provides a reliable platform for storing, managing, and retrieving student academic records. It supports large volumes of data, ensures data integrity, offers robust security features, and enables efficient query processing, making it suitable for handling academic records and generating reports.
Development Environment	Microsoft Visual Studio 2015	This provides an integrated development environment (IDE) that supports the development of database-driven applications for the programming languages used. It offers tools for coding, debugging, testing, and database integration, thereby improving development efficiency and system quality.
Hosting Software	XAMPP Server	XAMPP provides a local server environment that enables the hosting and testing of web-based applications during development. It integrates Apache, MySQL, PHP, and related services, allowing developers to simulate a live server environment before deployment.

Source: Primary data, 2026

4.3.1.2 Hardware Requirements

Table 7: Hardware requirements

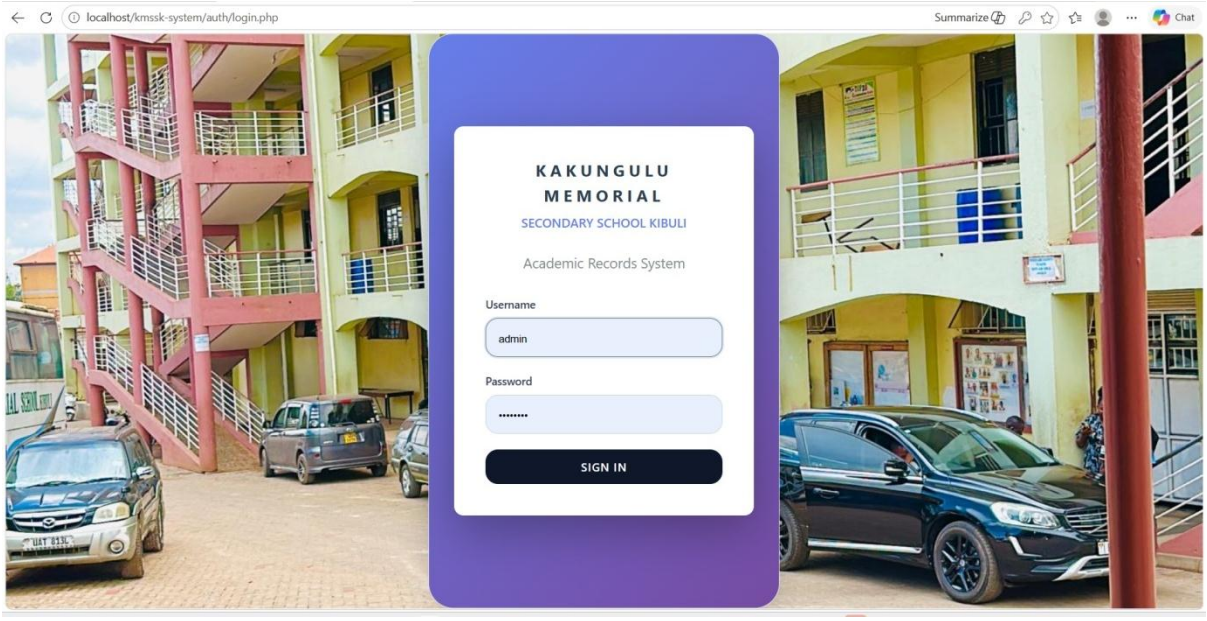
Hardware	Specification	Justification
Processor	Intel Core i3, 2.5 GHz or higher	This processor provides sufficient computing capacity to support system development, database operations, report generation, and simultaneous access by multiple users while remaining cost-effective for the school environment.
RAM	8 GB or higher	This provides adequate memory for running the web server, database management system, and web browser simultaneously without significant performance issues.
Storage	500 GB HDD or higher	Provides sufficient space for storing student records, system files, backups, and application software.

Source: Primary data, 2026

4.3.1.3 Security Requirements

The developed system has a unique login section for users such as admin (administrators), parents and teachers who can view and carry out a series of activities.

Figure 5: Shows the system login page



4.4. Objective three: To design and develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

Following the identification and analysis of the system and user requirements, the third objective of the study was to design and develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. The purpose of the system is to provide an integrated platform for managing student academic records, improving records accessibility, enhancing data accuracy, and supporting efficient decision-making within the school.

The design and development process transformed the validated user requirements into a functional software solution capable of supporting student registration, academic records management, attendance monitoring, performance tracking, report generation, and user administration. The system was developed as a centralized database-driven application with secure access controls and automated records processing functionalities.

4.4.1 System Design

The system was designed using a modular architecture to ensure flexibility, maintainability, and ease of future expansion. The design process involved the development of system models, database structures, user interfaces, and process workflows that guided the implementation phase.

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

The Presentation Layer, which provides user interfaces through which administrators, teachers, students, and parents interact with the system.

The Application Layer, which processes user requests, performs business logic, validates data, and controls access to system functions.

The Database Layer, which stores and manages academic records, student information, attendance records, examination results, and system user accounts.

The three-tier architecture was selected because it promotes separation of concerns, improves system scalability, and facilitates easier maintenance and future enhancements.

4.4.2 Database Design

A centralized relational database was designed to store and manage all academic records within the school. The database was developed using MySQL and consisted of interconnected tables designed to minimize data redundancy and improve data integrity.

The key database entities included: students, classes, subjects, teachers, examination results, attendance records, user accounts and academic reports

Relationships between these entities were established through primary and foreign keys to ensure consistency and efficient retrieval of information. The database structure enabled authorized users to access accurate and up-to-date academic records whenever required.

4.4.3 System Development Approach

The development of the system followed a modular design architecture. This approach allowed the development process to be conducted incrementally through several iterations, enabling continuous review and improvement of system components.

The design architecture was considered suitable because it facilitated regular consultations with school administrators, teachers, and ICT personnel during development. Feedback obtained from stakeholders was incorporated into subsequent development cycles, ensuring that the final system aligned with institutional needs and operational practices.

4.4.4 Developed System Modules

The completed system consisted of several integrated modules that collectively support academic records management activities at the school.

Student Registration Module

The Student Registration Module was developed to facilitate the capture and management of student biodata and enrolment information. Through this module, administrators can register new students, update student profiles, and maintain historical records.

The module captures information such a student name, registration number, date of birth, gender, class information, parent details and contact information.

The module ensures that all student information is stored in a centralized database and can be retrieved whenever required.

Academic Records Management Module

The Academic Records Management Module serves as the core component of the system. It enables the recording, storage, updating, and retrieval of student academic information.

Teachers can enter continuous assessment marks, examination scores, subject grades, and academic remarks. The system automatically stores these records and makes them available for future reference and reporting.

This module significantly reduces the reliance on paper-based records and minimizes the risk of data loss.

Attendance Management Module

The Attendance Management Module was developed to facilitate electronic recording and monitoring of student attendance.

Teachers can record daily attendance information, while administrators can generate attendance summaries and identify absenteeism trends. The module improves accountability and enables timely intervention in cases of persistent absenteeism.

Marks Processing and Grade Computation Module

The Marks Processing Module automates the calculation of student scores, grades, and overall academic performance.

After teachers enter examination marks, the system automatically computes subject totals, aggregate scores, grade classifications, position rankings where applicable

Automation reduces human error and improves the accuracy and consistency of academic results.

Report Generation Module

The Report Generation Module enables automatic production of student academic reports.

Users can generate individual report cards, class performance reports, subject analysis reports, examination summaries and attendance reports

The reports can be viewed electronically or printed for distribution to students, parents, and school administrators.

User Management Module

The User Management Module controls access to the system through role-based authentication mechanisms.

Different user categories were created, including system administrators, teachers, students and parents.

Each user category is granted specific privileges based on its responsibilities. This enhances system security and ensures that users only access information relevant to their roles.

4.4.5 User Interface Design

The system interfaces were designed with simplicity, usability, and ease of navigation in mind. The interfaces provide clear menus, organized forms, and intuitive navigation structures to enable users with varying levels of computer literacy to use the system effectively.

The dashboard serves as the main entry point into the system and provides quick access to key functionalities such as student registration, records management, attendance tracking, examination management, and report generation.

Input validation mechanisms were incorporated into forms to minimize data entry errors and improve data quality.

4.5. Objective four: To test and validate the developed database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

The fourth objective focused on testing the developed database-driven academic records management system in a real school environment and validating its effectiveness in managing student academic records. This involved pilot deployment of the system at Kakungulu Memorial Secondary School Kibuli and an evaluation of its functionality, usability, reliability, and overall contribution to academic records management. The findings presented in this section are based on system testing activities, user interactions, observations, and feedback obtained from teachers, administrators, and records personnel who participated in the evaluation process.

The following testing strategies were deployed

4.5.1 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.

4.5.1 System Usability Testing

System usability testing was conducted to assess users' experiences while interacting with the developed academic records management system.

A total of three hundred ten (310) respondents who successfully participated in the study were involved in the usability testing phase. These comprised students, teachers, administrative staff, and parents who interacted with the developed system and provided feedback through Google Forms using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

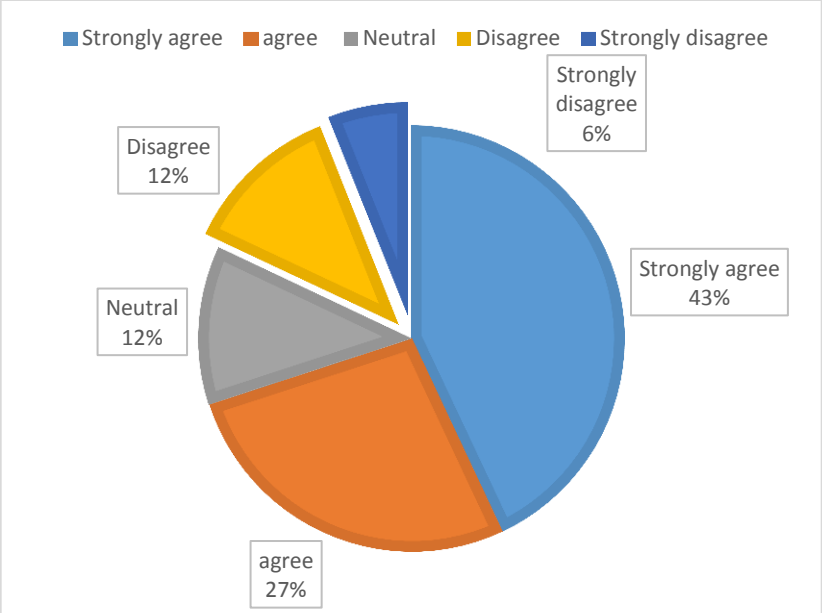
The pie charts below show the different responses from users on the experiences they had while using the developed system. This was achieved through the use of Google forms where we asked questions using Likert scale which generated the following pie charts.

Table 8: Shows the System Usability Testing Likert scale 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 interface is easy to navigate when accessing academic records such as results and attendance.					
3	The system provides clear instructions when entering student marks and grades.					
4	Administrators can easily manage user accounts and system roles within the system.					
5	Teachers can efficiently enter and update student marks without system difficulties.					
6	The system enables parents to view student academic progress and attendance remotely.					
7	The system generates accurate and well-structured student report cards automatically.					
8	The system provides reliable					

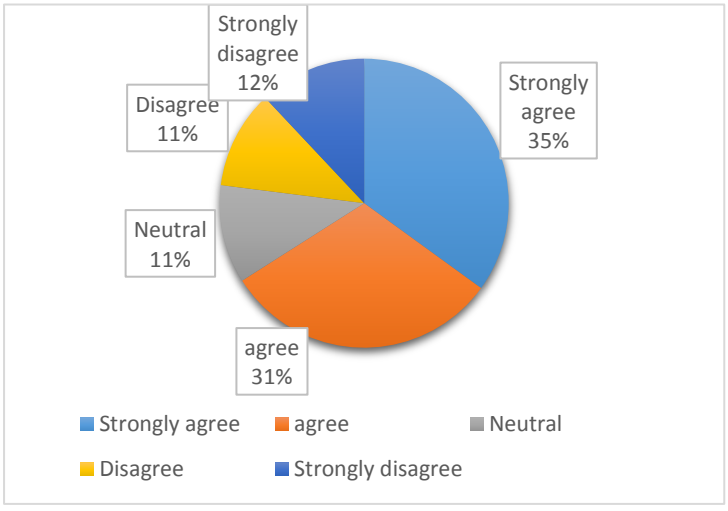
Figure 6: Shows responses on the developed academic records management system ease of use from the system usability scale



Results indicated that strongly agree had the highest responses with (43%), Agree (27%), strongly disagree (12%), neutral (12%) and disagree were (12%) responses. This proves that the developed system is easy to use as majority (70%) of the users agreed with this.

Source: Primary data, 2026

Figure 7: *Shows responses on the developed academic records management system use without assistance using the system usability scale*



Results indicated that strongly agree had the highest responses with (35%), Agree (31%), strongly disagree (12%), neutral (11%) and disagree were (11%) responses. This proves that users will need little or no assistance to use the developed system since majority of the responses were positive.

Source: Primary data, 2026

Key user feedback further indicated that respondents appreciated the simplicity of the user interface, the ease of accessing academic records, and the automated report generation functionality. However, a few respondents recommended incorporating brief user orientation

sessions and help prompts within the system to support first-time users and improve overall user experience.

4.5.2 Security and Data Validation Testing

Security testing was conducted to verify the protection of academic records and ensure that unauthorized users could not access sensitive information. The developed system employed role-based access control mechanisms that assigned permissions according to user categories such as administrator, teacher, student, and parent.

Authentication mechanisms including usernames and passwords were tested successfully. Unauthorized login attempts were denied access, and invalid credentials generated appropriate error messages.

Input validation was also tested to ensure accuracy and completeness of records entered into the system. The developed system rejected incomplete forms, invalid marks, and duplicate entries. This minimized data inconsistencies and improved reliability of stored information.

Furthermore, backup and recovery mechanisms were tested to verify protection against accidental loss of records. The developed system successfully restored stored academic information from backup files during testing procedures.

4.5.3 Validation Against User Requirements

Validation was conducted to determine whether the developed system fulfilled the requirements identified during the requirements analysis phase. The developed system was evaluated based on usability, accessibility, reliability, security, and effectiveness in managing academic records.

4.5.4 Compatibility and Performance Testing

The developed system was tested across multiple devices and web browsers to ensure consistency and compatibility. Tests were successfully conducted on Chrome, Firefox, Edge, and Safari browsers. The developed academic records management system responded seamlessly, maintaining layout structure and functionality across all platforms.

Performance testing involved simulating high user traffic to evaluate the developed system responsiveness. The developed system sustained multiple and concurrent academic records management activities without performance degradation. Load testing confirmed that the host-based infrastructure supported a high volume of requests, reinforcing the platform's scalability as a key requirement given the school's high student and academic records traffic.

A study has reported that robust load handling and scalability are critical to maintaining system performance and user experience during peak demand periods (Chen et al., 2020).

CHAPTER FIVE: A DATABASE-DRIVEN ACADEMIC RECORDS MANAGEMENT SYSTEM FOR KAKUNGULU SECONDARY SCHOOL KIBULI

5.0 Introduction

This chapter presents the system design and finally system implementation through the use of system forms and screenshots.

5.1 System Design

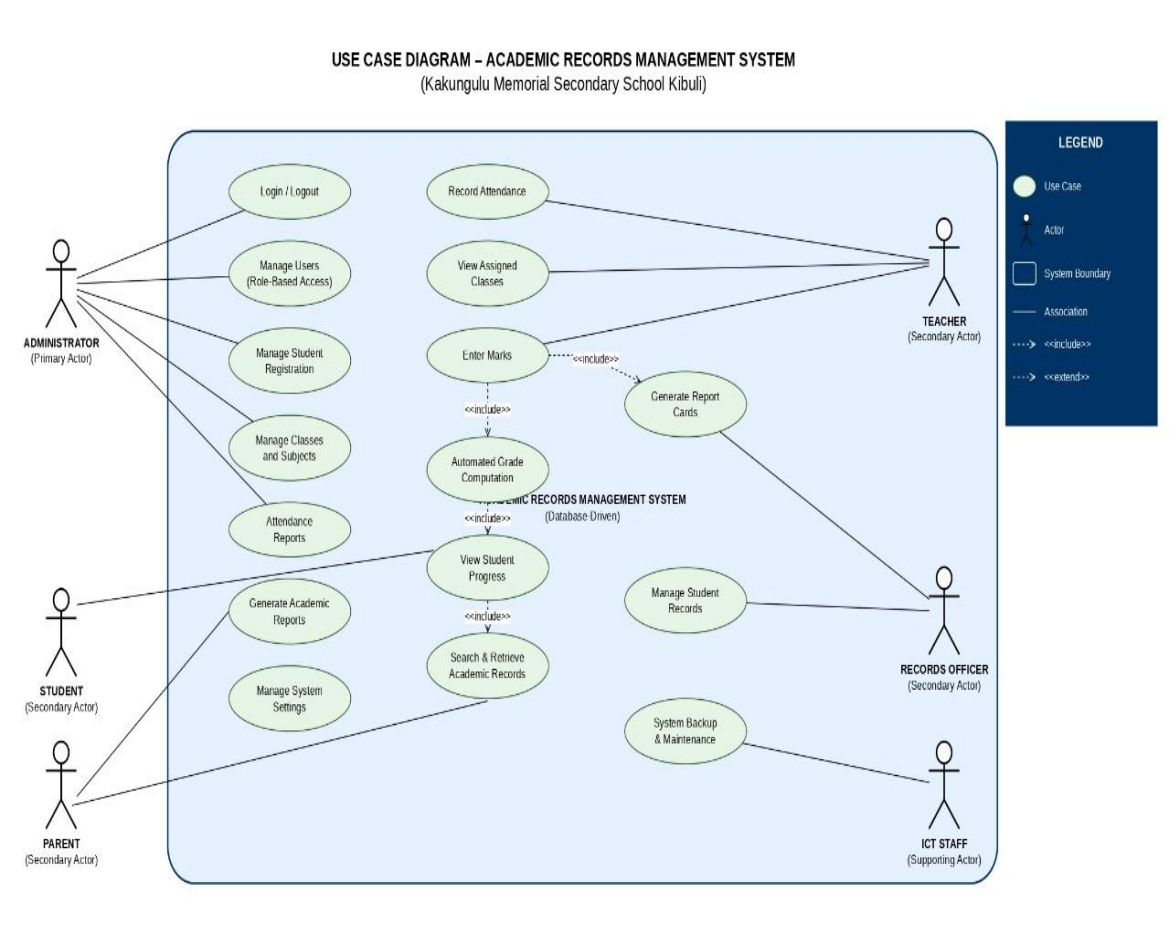
The research team designed the system by analyzing and modelling the key processes, data structures, and interactions required within the database-driven system developed for KMSSK for its effective operation.

In the system design phase, various diagrams were developed to illustrate the architecture, data flow, and interactions within the developed system for the school. These diagrams play a crucial role in visualizing and structuring the system components.

5.1.1 Use Case Diagram

A System Use Case Diagram is a Unified Modelling Language diagram that illustrates the functional requirements of a system by showing the interactions between external users (actors) and the services or functions (use cases) 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 8: The System Base Use Case Diagram



The use case diagram above for the Database-Driven Academic Records Management System illustrates the interactions between system users (actors) and the functionalities provided by the system. It defines the responsibilities of each actor and shows how different users interact with the system to perform academic records management activities.

Actors in the System

Administrator (Primary Actor)

The Administrator is responsible for the overall management and control of the system. The administrator manages user accounts and access rights, student registration, classes and subjects, attendance reports, academic reports, and system settings. The administrator also ensures that the system operates securely and efficiently.

Teacher

The Teacher interacts with the system to support academic and classroom activities. Teachers record attendance, enter student marks, view assigned classes, and monitor student academic progress.

Student

The Student accesses the system to view academic reports and monitor personal academic progress. The student can retrieve academic information generated and maintained within the system.

Parent

The Parent uses the system to monitor the academic performance and progress of their child through generated academic reports and progress information.

Records Officer

The Records Officer is responsible for managing student records and maintaining the integrity of academic information stored in the database.

ICT Staff

The ICT Staff supports technical operations of the system, including system backup and maintenance activities to ensure system availability and reliability.

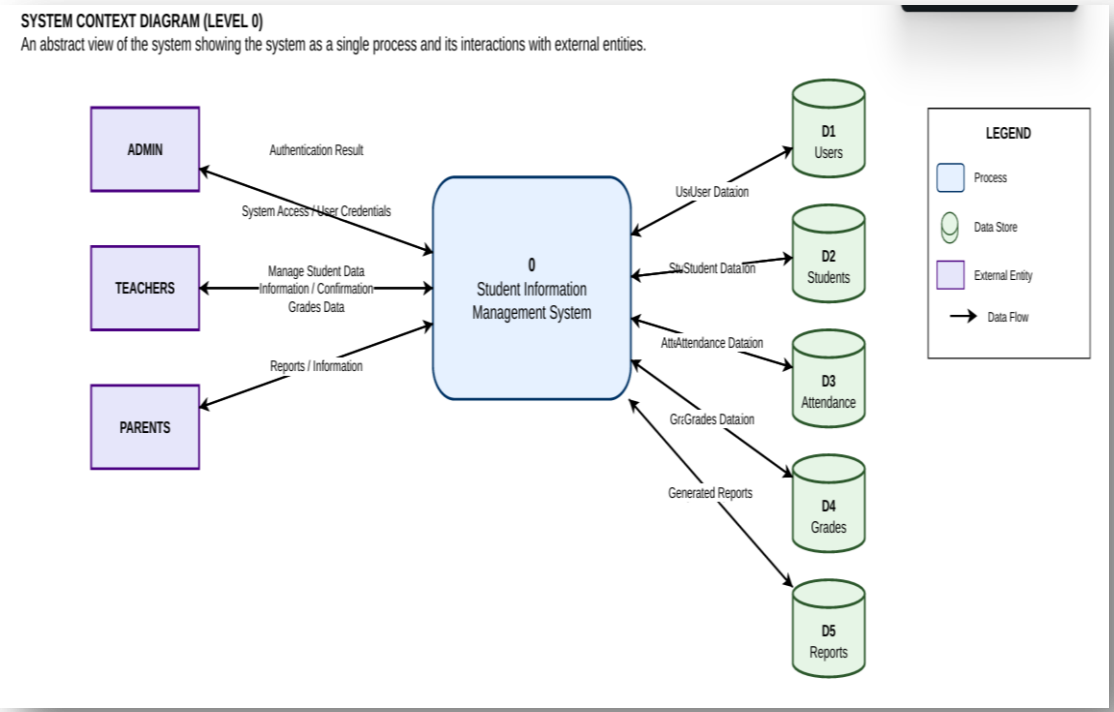
The use case diagram also shows relationships between certain functionalities. The Enter Marks use case includes Automated Grade Computation, meaning that once marks are entered, the system automatically calculates grades. Similarly, Automated Grade Computation includes View Student Progress, allowing performance information to be generated from processed academic results. The View Student Progress use case further includes Search and Retrieve Academic Records, which enables users to access relevant academic information stored within the database.

These relationships demonstrate how the various system functions work together to support efficient academic records management at Kakungulu Memorial Secondary School Kibuli.

5.1.2System context Diagram (Level 0)

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 (Dennis et al., 2021).

Figure 9: Shows the system context diagram(Level 0)



The System Context Diagram above (Level 0) provides a high-level view of the Database-Driven Academic Records Management System and illustrates its interactions with external entities. At this level, the entire system is represented as a single process, showing how data flows between the system and its external users. The diagram identifies the major stakeholders who interact with the system and the primary data stores used to manage academic information.

Central Process: Student Information Management System

The Student Information Management System acts as the central process responsible for managing and processing academic information within Kakungulu Memorial Secondary School Kibuli. The system authenticates users, manages student records, processes attendance information, stores academic grades, and generates reports for authorized users. It

serves as a centralized platform that improves the storage, retrieval, and management of academic records.

External Entities

Administrator

The Administrator is responsible for the overall management and control of the system. The administrator provides authentication credentials to access the system and submits information related to student management, system administration, and academic records management.

The system returns authentication results, system notifications, and generated reports to the administrator. Through these interactions, the administrator oversees system operations and ensures that academic records are properly maintained.

Teachers

Teachers interact with the system to manage student academic information. They provide student data, attendance information, and grades data for processing and storage within the system.

In return, teachers receive student information, academic records, and reports that support classroom management and assessment activities. These interactions enable teachers to maintain accurate and up-to-date student records.

Parents

Parents interact with the system primarily to monitor the academic progress of their children. They submit requests for academic information and receive reports and progress information generated by the system.

This interaction promotes parental involvement by providing timely access to student academic performance information.

Data Stores

The system utilizes several data stores to manage and maintain academic information:

D1: Users – Stores user account information, authentication credentials, and access control details.

D2: Students – Stores student registration details, personal information, and academic records.

D3: Attendance – Stores attendance records submitted by teachers for monitoring student participation.

D4: Grades – Stores examination results, assessment scores, and computed academic performance records.

D5: Reports – Stores generated academic reports and performance summaries for retrieval by authorized users.

Data Flows

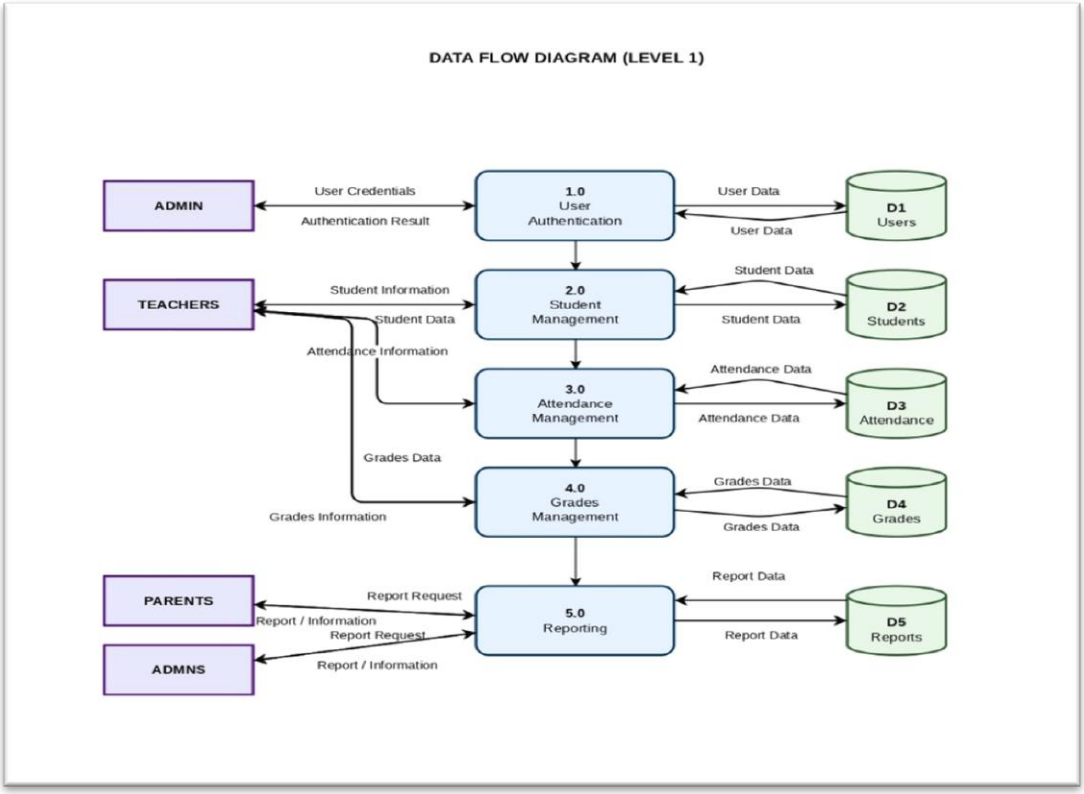
Data flows represent the movement of information between external entities, the central process, and the data stores. The administrator provides authentication credentials and management information to the system and receives authentication results and reports. Teachers submit student, attendance, and grades data, while receiving academic information and reports from the system. Parents request and receive academic reports and student progress information. The system processes this information and stores it in the appropriate data stores to support efficient academic records management.

The System Context Diagram therefore provides a high-level representation of how the Database-Driven Academic Records Management System interacts with its users and manages academic information within a centralized environment.

5.1.3Process Modelling Using the Data Flow (Level 1) Diagram

A Data Flow Diagram 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. It is widely used during systems analysis to describe system functionality from a logical perspective (Kendall et.al, 2020).

Figure 10:*Shows the System Data Flow-Level 1 Diagram*



1.0 User Authentication

The User Authentication process serves as the entry point to the system. The Administrator enters login credentials into the system, which are validated against the Users database (D1). The authentication process retrieves user data from the database and verifies the credentials provided. Upon successful verification, the system returns an authentication result, granting authorized access to system functionalities. This process ensures that only registered users can access academic records and administrative functions.

2.0 Student Management

Once authenticated, users can access the Student Management module. This process is responsible for capturing, updating, storing, and retrieving student information. Teachers and administrators submit student details such as registration information, class allocation, personal details, and academic profiles. The process stores and retrieves this information from the Students database (D2). Student information can then be accessed by authorized users whenever required for academic or administrative purposes.

3.0 Attendance Management

The Attendance Management process handles the recording and management of student attendance data. Teachers submit attendance information for students, which is processed and stored in the Attendance database (D3). The system enables retrieval of attendance records for monitoring student presence, absenteeism, and punctuality. This process improves the accuracy and accessibility of attendance records while reducing manual paperwork.

4.0 Grades Management

The Grades Management process is responsible for recording, updating, and maintaining students' academic performance records. Teachers enter grades and assessment results into the system. The process stores this information in the Grades database (D4) and retrieves it when required for performance analysis and report generation. The module ensures accurate management of examination scores, continuous assessment marks, and final grades.

5.0 Reporting

The Reporting process generates academic and administrative reports based on data collected from the other modules. Parents and Administrators submit report requests to the system. The reporting module retrieves relevant information from the Reports database (D5) and generates reports such as student progress reports, attendance summaries, performance analyses, and academic transcripts. The generated reports are then returned to the requesting users in the form of report information.

Data Stores

The system utilizes five major databases to ensure proper storage and retrieval of information:

D1 – Users Database: Stores user account details and authentication information.

D2 – Students Database: Stores student registration and profile information.

D3 – Attendance Database: Stores attendance records and related information.

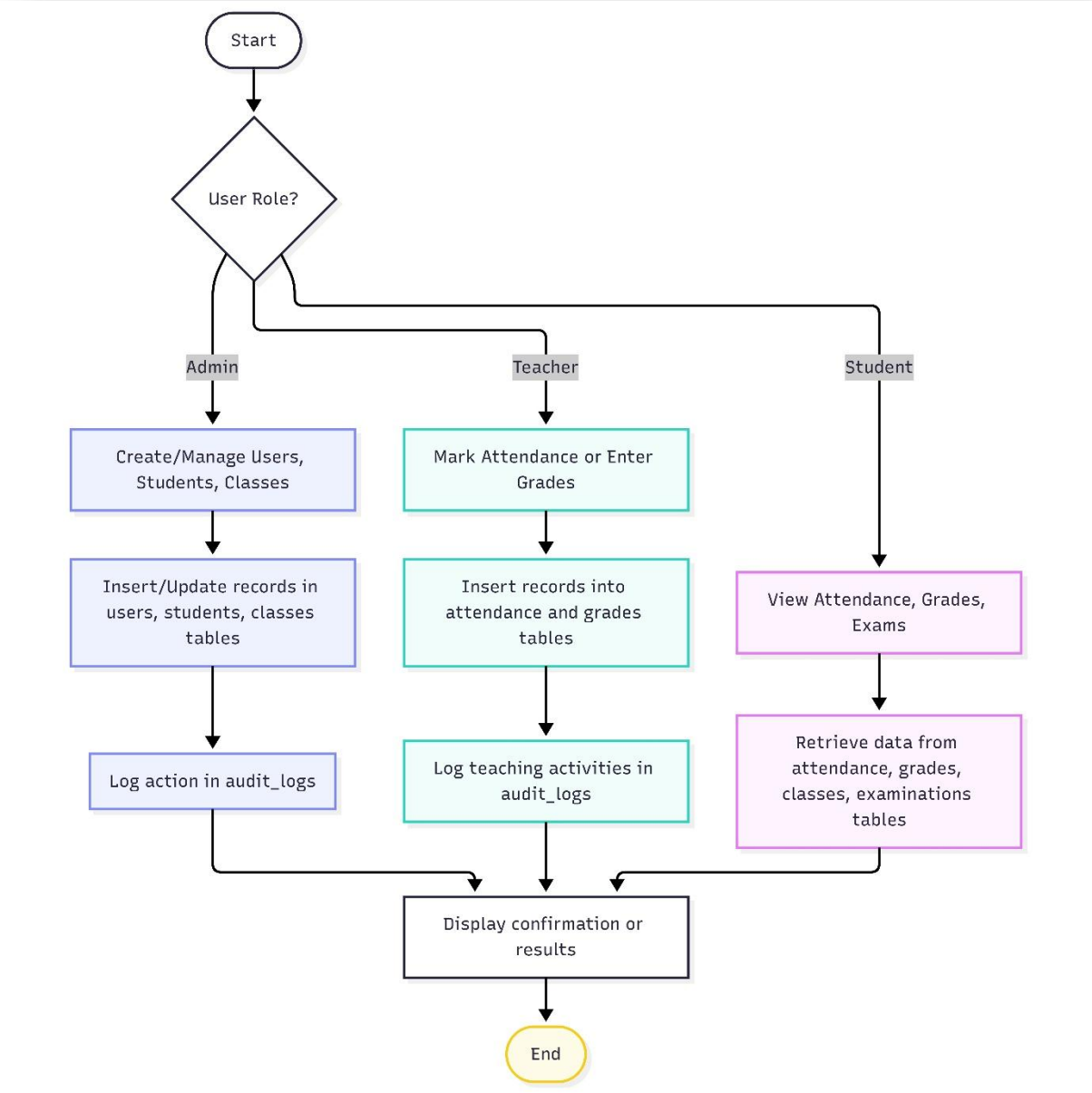
D4 – Grades Database: Stores examination results, assessments, and academic performance records.

D5 – Reports Database: Stores generated reports and reporting data.

5.1.4 Activity Diagram

A System Activity Diagram is a UML 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.

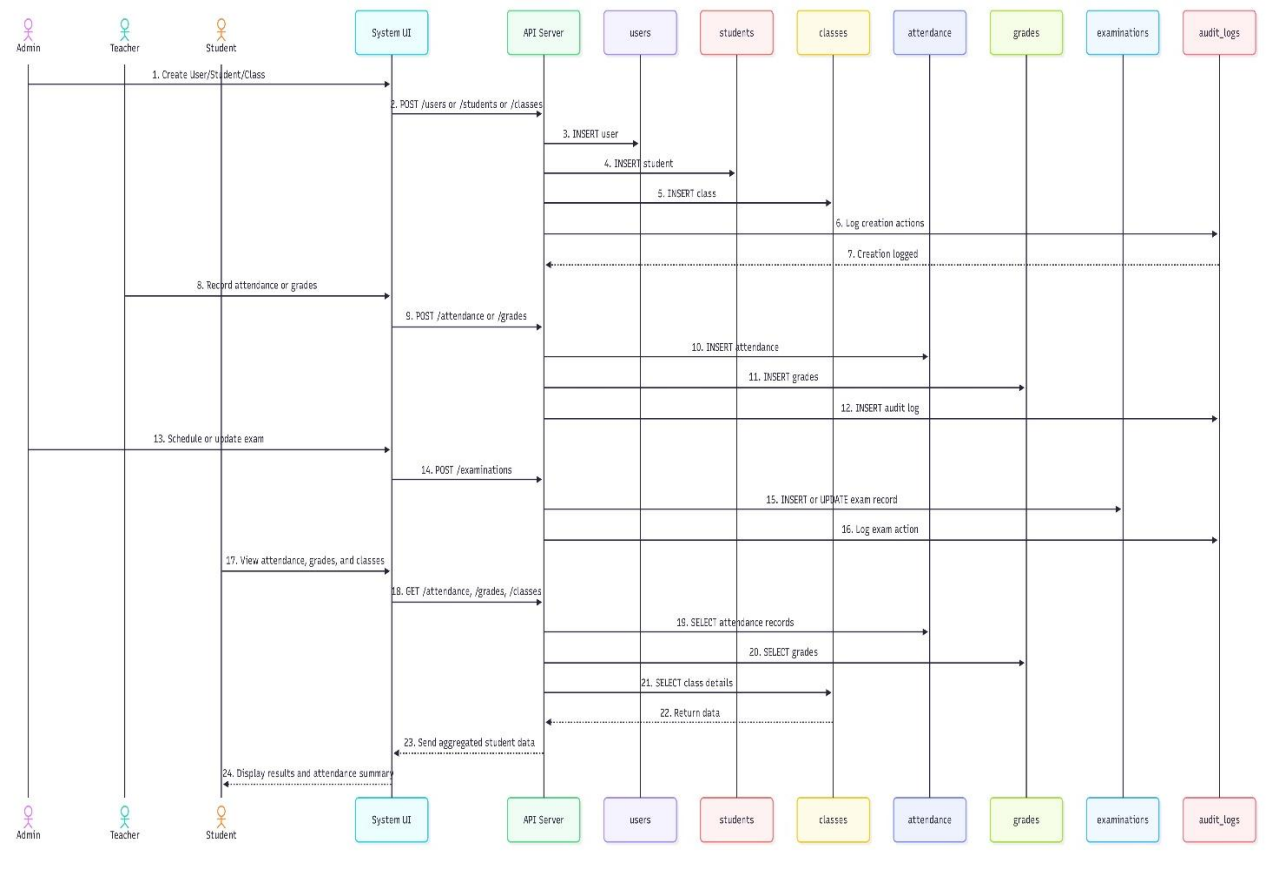
Figure 11: Shows the system activity diagram



5.1.5 Sequence Diagram

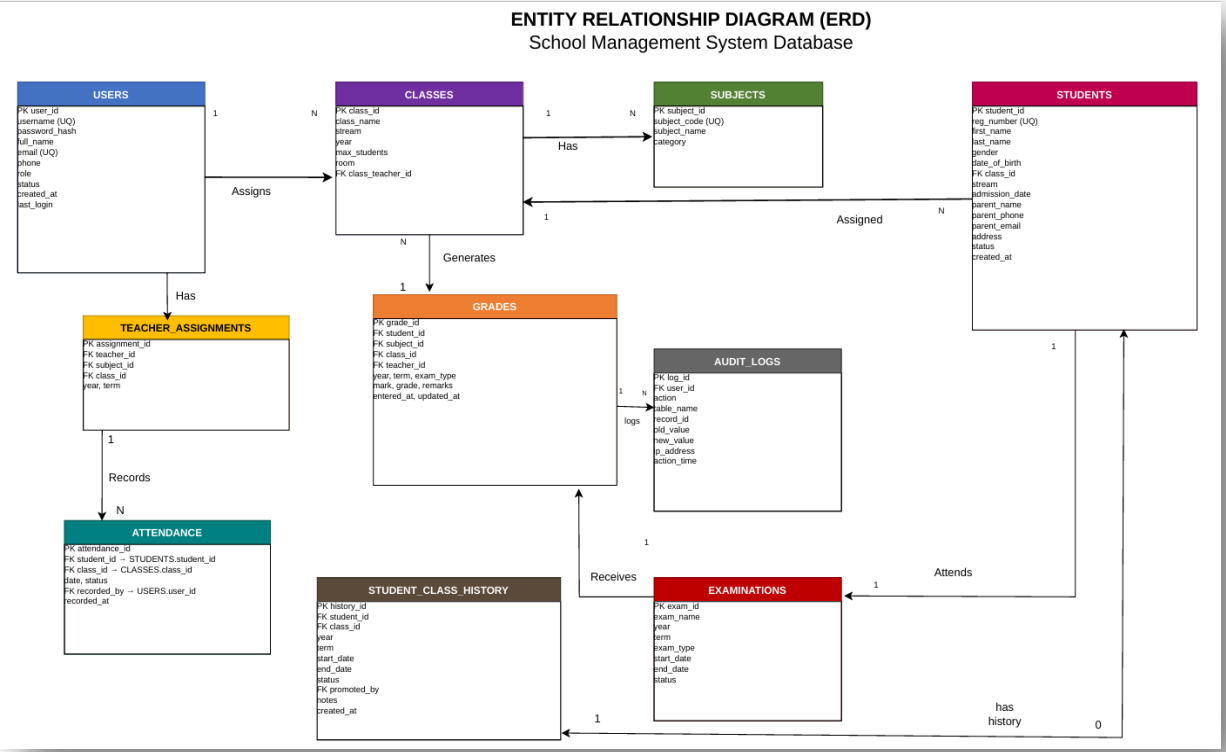
A System Sequence Diagram is a UML behavioral diagram that illustrates the chronological order in which messages are exchanged between system users and the system to accomplish a particular task. It emphasizes the sequence of interactions rather than the internal processing logic.

Figure 12: Shows the system sequence diagram



5.1.6Entity Relationship Diagram

Figure 13:Shows the Entity Relationship Diagram



The Entity Relationship Diagram (ERD) models the core academic records management entities and their relationships. The central entity is the STUDENT table, which interacts with CLASS, RESULTS, ATTENDANCE, REPORT_CARD, and STUDENT_PARENT entities. The design supports efficient storage, retrieval, and reporting of academic information.

Key relationships include:

One Class can contain many Students, but each Student belongs to one Class.

One Teacher can teach many Subjects and record many Results.

One Student can have many Attendance records.

One Student can have many Examination Results.

One Parent can be linked to many Students and vice versa through the STUDENT_PARENT relationship table.

One User account belongs to a specific role such as Administrator, Teacher, Parent, or Student.

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 9: Shows the logical Database Design

Table Name	Primary Key	Fields	Foreign Keys & Constraints
USERS	user_id	user_id (int, auto_increment), username (varchar(50), not null, unique index), password (varchar(255), not null), full_name (varchar(100), not null), email (varchar(100), unique, null allowed), phone_number (varchar(20), null), role (enum('administrator','teacher','parent','student'), not null), status (enum('active','inactive'), default 'active'), created_date (datetime, default current_timestamp)	INDEX(username), INDEX(email)
ADMINISTRATOR	admin_id	admin_id (int, auto_increment), user_id (int, not null), designation (varchar(100), not null)	FK: user_id → USERS(user_id) ON DELETE CASCADE ON UPDATE CASCADE, UNIQUE(user_id)
TEACHER	teacher_id	teacher_id (int, auto_increment), user_id (int, not null), staff_number (varchar(30), not null, unique), specialization (varchar(100)), department (varchar(100))	FK: user_id → USERS(user_id) ON DELETE CASCADE ON UPDATE CASCADE, INDEX(staff_number)
PARENT	parent_id	parent_id (int, auto_increment), user_id (int, not null), occupation (varchar(100)), relationship_type (varchar(50))	FK: user_id → USERS(user_id) ON DELETE CASCADE ON UPDATE CASCADE
STUDENT	student_id	student_id (int, auto_increment), user_id (int, not null), student_no	FK: user_id → USERS(user_id)

		(varchar(30), not null, unique), class_id (int, not null), gender (varchar(10), not null), date_of_birth (date, null), status (varchar(20), default 'active')	ON DELETE CASCADE, FK: class_id → CLASS(class_id) ON DELETE RESTRICT ON UPDATE CASCADE, INDEX(student_no)
CLASS	class_id	class_id (int, auto_increment), class_name (varchar(50), not null), stream (varchar(50)), room (varchar(30))	UNIQUE(class_name, stream)
SUBJECT	subject_id	subject_id (int, auto_increment), subject_name (varchar(100), not null), category (varchar(50))	UNIQUE(subject_name), INDEX(subject_name)
TEACHER_ASSIGNMENT	assignment_id	assignment_id (int, auto_increment), teacher_id (int, not null), subject_id (int, not null), class_id (int, not null), academic_year (int, not null), term (int, not null)	FK: teacher_id → TEACHER(teacher_id) ON DELETE CASCADE, FK: subject_id → SUBJECT(subject_id) ON DELETE CASCADE, FK: class_id → CLASS(class_id) ON DELETE CASCADE, UNIQUE(teacher_id, subject_id, class_id, academic_year, term)
ATTENDANCE	attendance_id	attendance_id (int, auto_increment), student_id (int, not null), class_id (int, not null), attendance_date (date, not null), status (enum('present','absent','late','excused'), not null), recorded_by (int, not null)	FK: student_id → STUDENT(student_id) ON DELETE CASCADE, FK: class_id → CLASS(class_id), FK: recorded_by → TEACHER(teacher_id) ON DELETE SET NULL, INDEX(attendance_date)
EXAMINATION	exam_id	exam_id (int, auto_increment), exam_name (varchar(100), not null), term (int, not null), year (int,	INDEX(year, term)

		not null), exam_type (varchar(50)), start_date (date), end_date (date), status (enum('planned','ongoing','completed','published'), default 'planned')	
RESULTS	result_id	result_id (int, auto_increment), student_id (int, not null), subject_id (int, not null), exam_id (int, not null), teacher_id (int, not null), marks (decimal(5,2), check (marks between 0 and 100)), grade (varchar(5)), remark (varchar(255))	FK: student_id → STUDENT(student_id) ON DELETE CASCADE, FK: subject_id → SUBJECT(subject_id), FK: exam_id → EXAMINATION(exam_id), FK: teacher_id → TEACHER(teacher_id), UNIQUE(student_id, subject_id, exam_id)
REPORT_CARD	report_id	report_id (int, auto_increment), student_id (int, not null), term (int, not null), year (int, not null), class_position (int), average_score (decimal(5,2)), generated_date (date, default current_date)	FK: student_id → STUDENT(student_id) ON DELETE CASCADE, UNIQUE(student_id, term, year)
STUDENT_PARENT	id	id (int, auto_increment), student_id (int, not null), parent_id (int, not null), relationship_type (varchar(50))	FK: student_id → STUDENT(student_id) ON DELETE CASCADE, FK: parent_id → PARENT(parent_id) ON DELETE CASCADE, UNIQUE(student_id, parent_id)
AUDIT_LOG	log_id	log_id (int, auto_increment), user_id (int, not null), activity (varchar(255), not null), timestamp (datetime, default current_timestamp), ip_address (varchar(45))	FK: user_id → USERS(user_id) ON DELETE SET NULL, INDEX(user_id), INDEX(timestamp)

The table above summarizes the logical database design which includes the different tables from the ERD and their respective fields clearly indicating the primary keys and foreign keys in the tables. The tables include Users, Students, Classes, Subjects and Grades among others all having their respective fields.

5.1.7.1 Database design alignment with system requirements

This mapping below demonstrates how database design directly supports system requirements.

Table 10: Shows the Requirement-to-Database design Mapping

Requirement	Supporting Entities
Student Registration	STUDENT, CLASS
Attendance Tracking	ATTENDANCE
Grade Processing	RESULTS, SUBJECT
Parent Portal	PARENT, STUDENT_PARENT
User Management	USERS
Report Generation	REPORT_CARD
Academic Analytics	RESULTS, REPORT_CARD
Security Monitoring	AUDIT_LOG

5.1.7.2. 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 atomic values and removal of repeating groups.

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

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

Normalization minimizes data duplication, improves consistency, and prevents insertion, update, and deletion anomalies (Silberschatz, Korth, & Sudarshan, 2019).

5.1.7.3 Scalability and Performance

The database design was developed to support future growth and increasing system usage. Performance is enhanced through the use of indexed primary keys and foreign keys to facilitate faster retrieval of records. The design adopted optimized relational structures and normalized tables to reduce redundancy and improve query efficiency. Operational data was separated from audit data to minimize processing overhead and improve maintainability. Furthermore, the three-tier architecture allowed independent scaling of the presentation,

system, and database layers. The system therefore accommodates increasing student populations, additional users, and future expansion to cloud-based infrastructure without significant redesign.

5.1.7.4 Handling Historical Data

The database design incorporated mechanisms for preserving historical academic information to support reporting, auditing, and long-term record management. Historical records are maintained through attendance history, examination result archives, report card records, student promotion records, and audit logs that capture system activities performed by users. Instead of permanently deleting critical academic records, the system employs soft-delete mechanisms to retain historical information while preventing accidental data loss. These measures ensure that past academic records remain accessible for administrative review, performance analysis, and institutional reporting.

5.1.7.5 Security And Data Privacy

The system incorporated multiple layered security mechanisms to ensure the confidentiality, integrity, and availability of academic records. Security has been implemented at both application and database levels to protect sensitive student information from unauthorized access, alteration, or loss.

Findings from the system design and implementation established that user authentication is strengthened through password hashing using secure algorithms such as BCrypt, ensuring that user credentials are not stored in plain text within the database. In addition, role-based access control (RBAC) was implemented to ensure that different categories of users (administrators, teachers, students, and parents) can only access data relevant to their permissions and responsibilities.

The system further incorporated field-level security measures, where sensitive information such as student personal details and examination records is protected through controlled access rules within the database layer. This ensures that only authorized operations can be performed on critical data fields, reducing the risk of unauthorized modification or exposure.

To enhance accountability and traceability, the system includes an audit logging mechanism (AUDIT_LOG table) that records all key user activities such as logins, data entry, updates, deletions, and report generation. This enables system administrators to monitor user actions and detect any suspicious or unauthorized activities.

Data protection is further reinforced through input validation and sanitization, which prevents malicious inputs such as SQL injection and ensures that only correctly formatted data is stored in the system. The system also employs secure session management and authentication controls to prevent session hijacking and unauthorized access during active user sessions.

In addition, encryption mechanisms are applied to sensitive data and database backups, ensuring that stored and archived information remains protected even in cases of unauthorized physical or digital access. Communication between the client and server is secured using HTTPS protocol, which encrypts data during transmission and protects it from interception

5.2 System Implementation

The System consists of several interconnected components, each of which performs a specific role in achieving the objectives of this project as stated earlier in this report. These components work together to ensure efficient management of academic records, secure handling of user information, and effective monitoring of student academic progress. The major components of the system include:

1. User Authentication and Access Control

The system provides a secure authentication mechanism that allows only authorized users to access the system. Different user roles such as administrators, teachers, parents and students are assigned specific access privileges to ensure data confidentiality and system security. This component helps prevent unauthorized access to sensitive academic records and administrative information. This was implemented through the login form which allows the school administration, teachers, students and parents to access the dashboard and manage other system modules.

Figure 14: Shows the system login form for school administration and other critical users

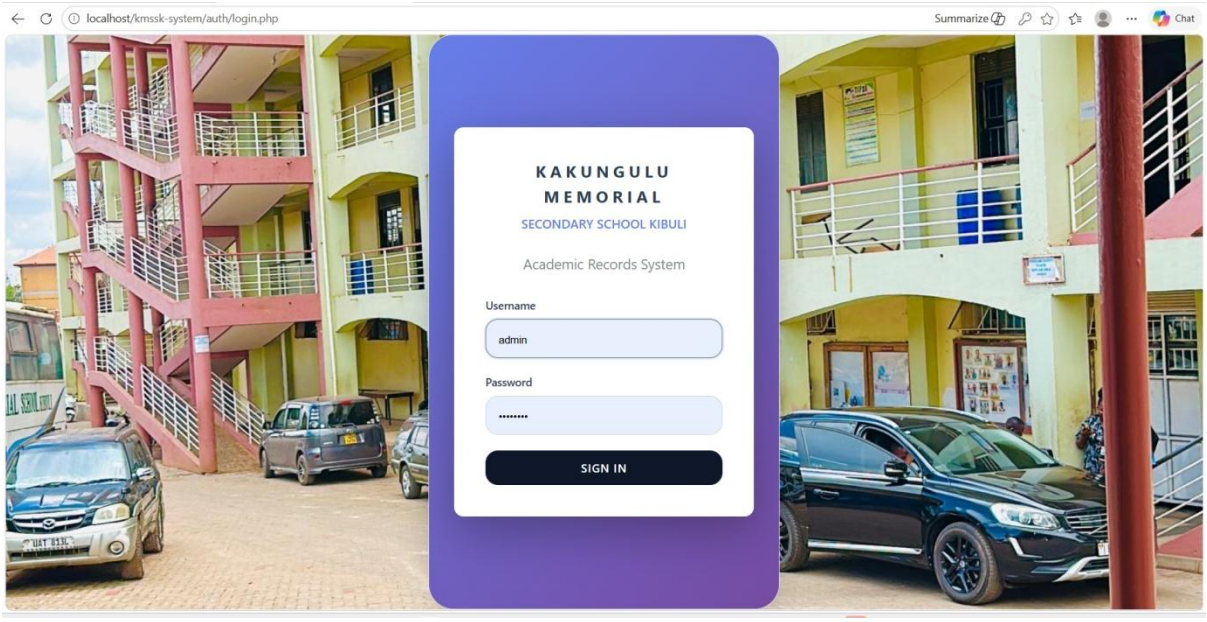


Figure 15: Shows successful login into the system and administrator dashboard

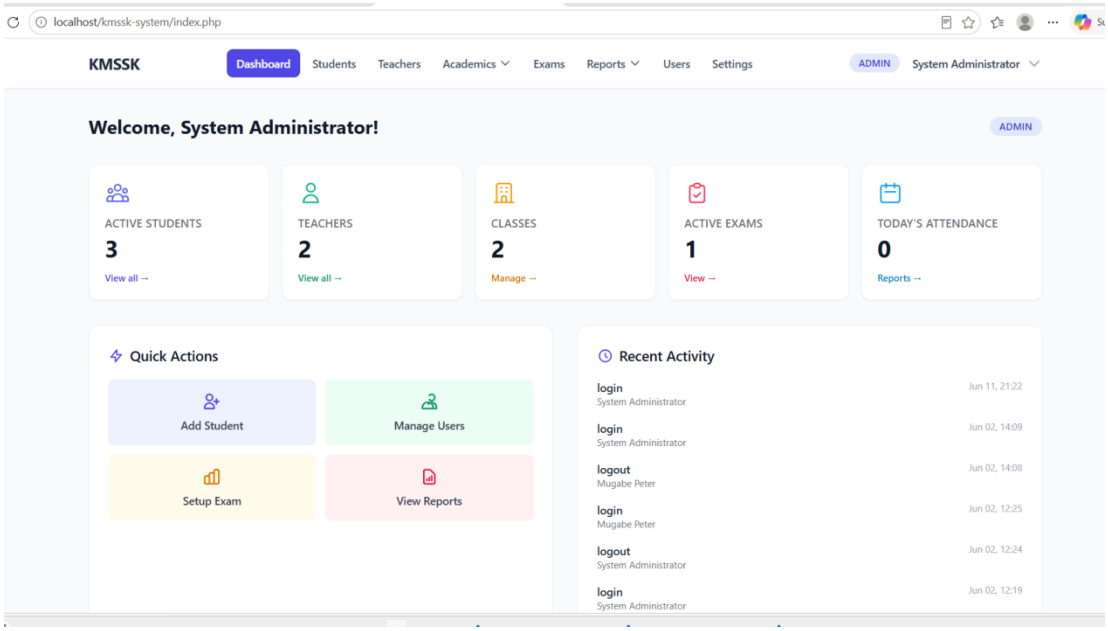


Figure 16: Shows the system users management page interface

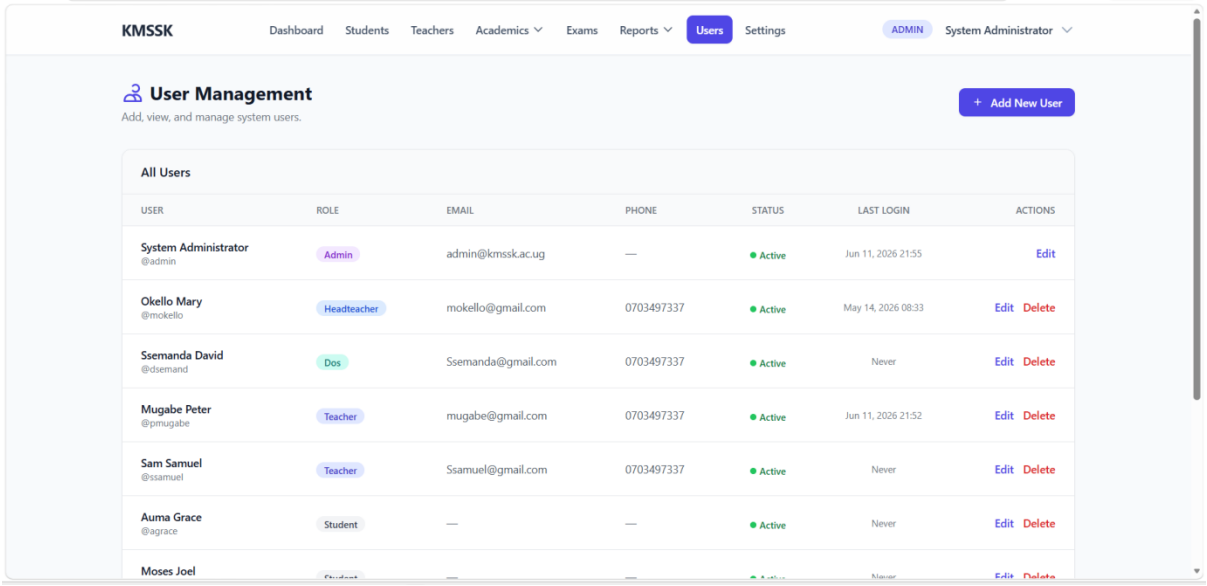
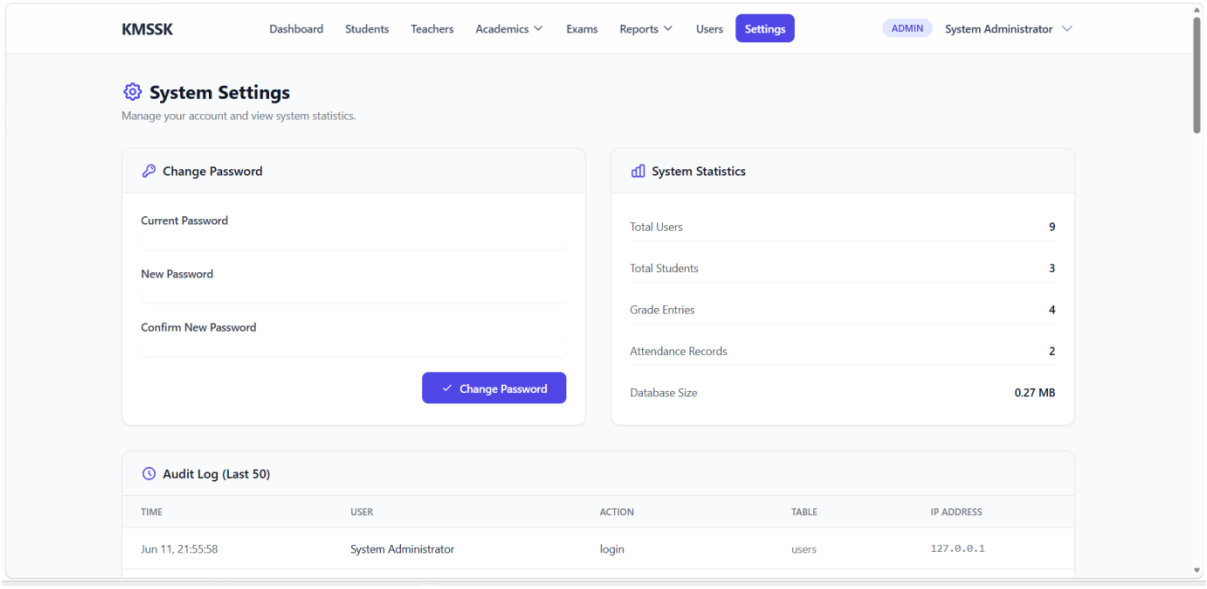


Figure 17: Shows the system settings and management page interface



2. Student Records Management

This component enables the search, registration, storage, updating, and retrieval of student information within the system. It manages essential student details including student identification information, class allocation, and academic history. The component ensures organized and centralized management of student records for easy accessibility and improved administration.

Figure 18: Shows the student records search and information management page interface

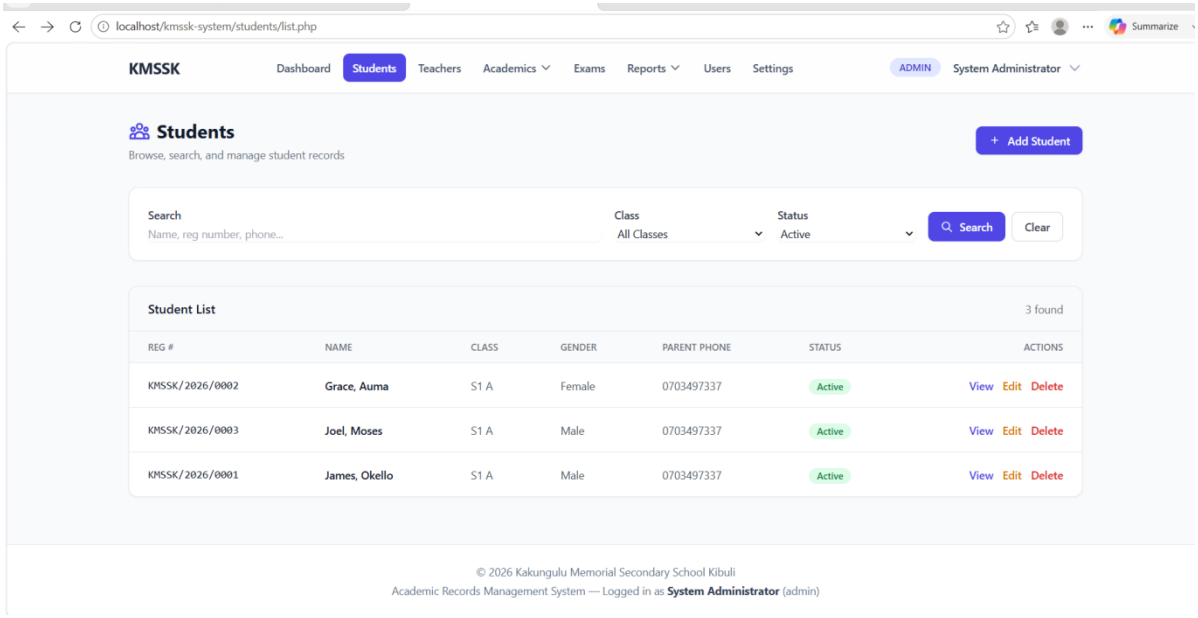
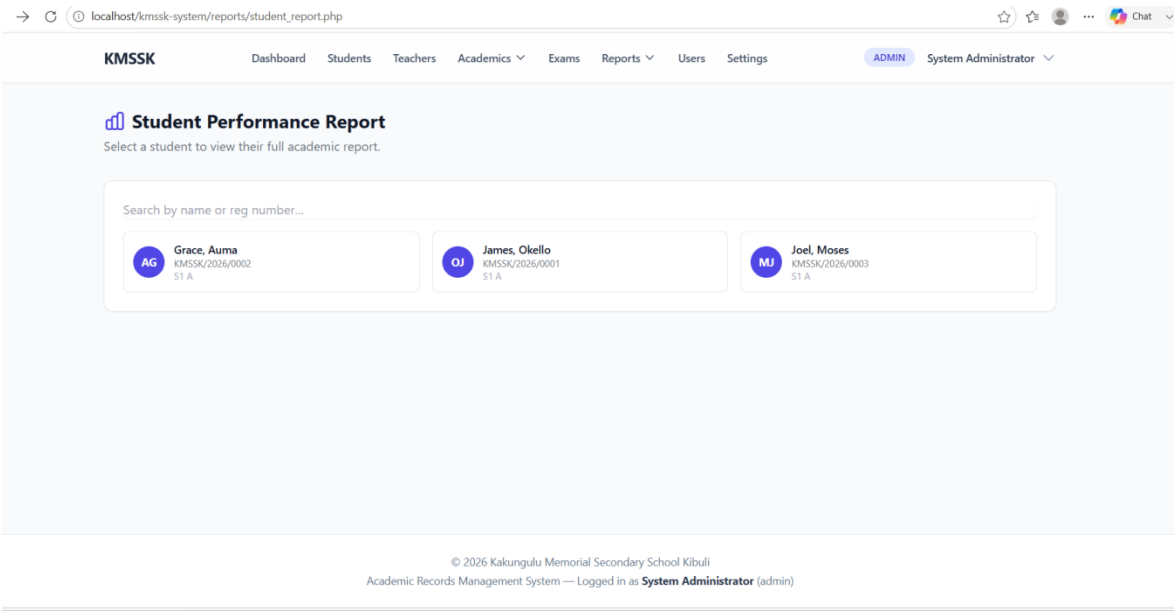


Figure 19: Shows the student report and academic history retrieval page



3. Class and Subject Management

The system contains modules for managing classes and academic subjects offered within the institution. Administrators can create and organize classes, assign subjects, and maintain academic structures efficiently. This component simplifies the organization of academic programs and supports proper coordination of teaching activities.

Figure 20: Shows the class registration and management page

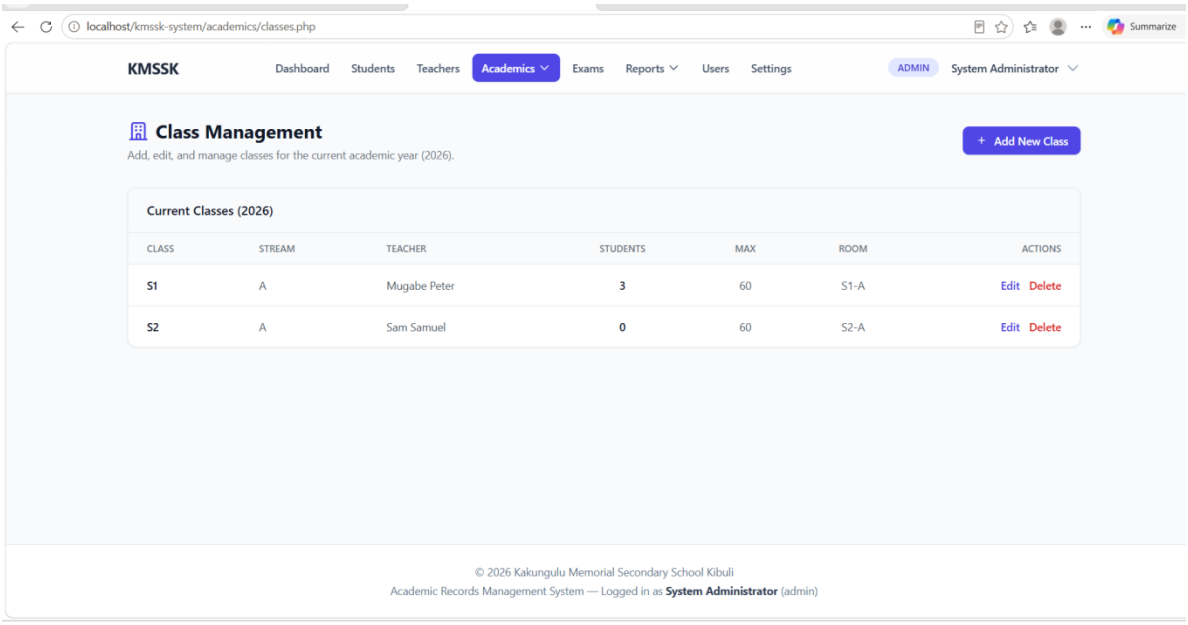


Figure 21: Shows the class registration and management form page

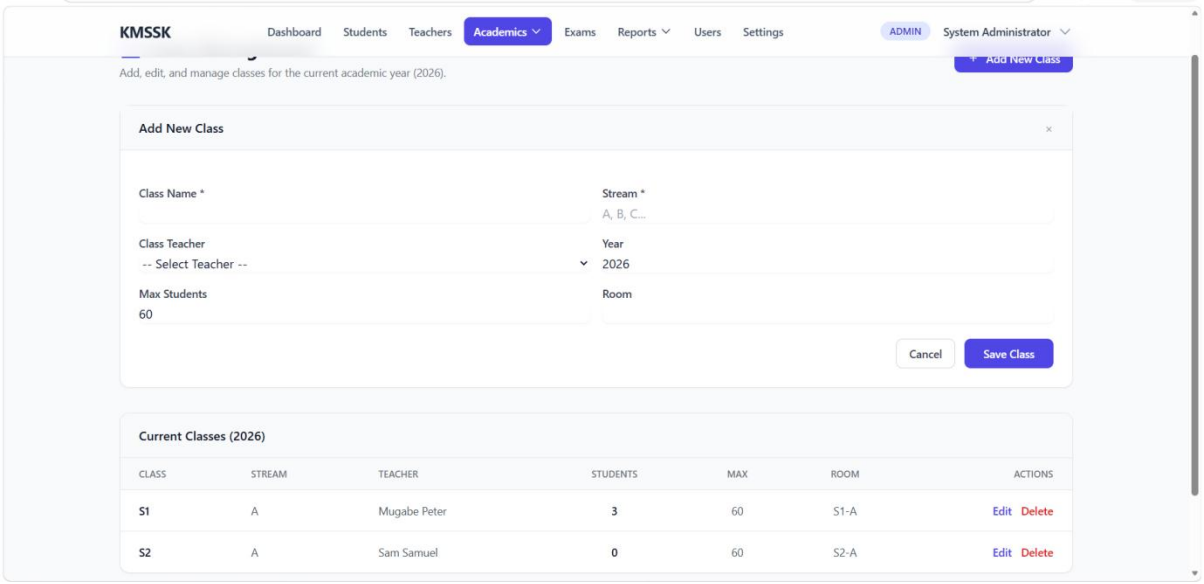
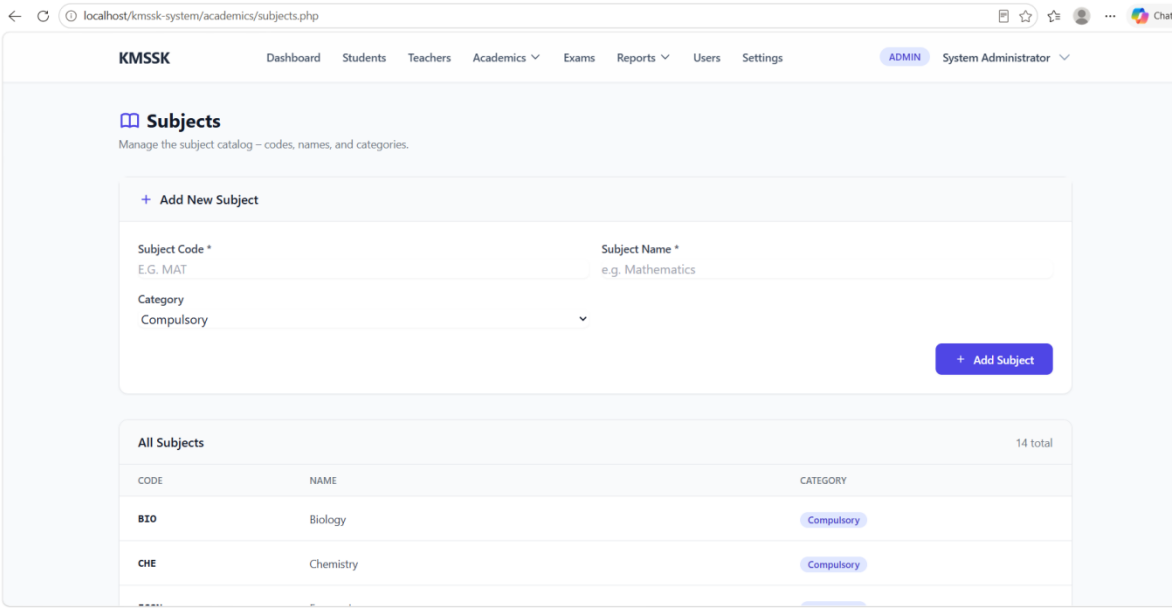


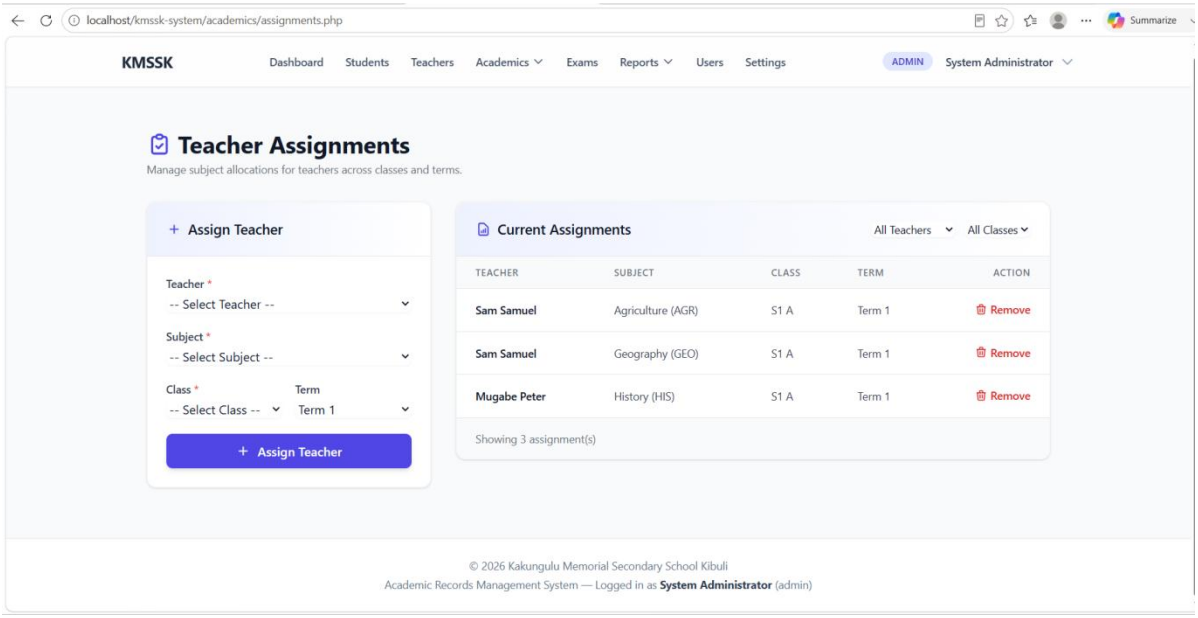
Figure 22:Shows the subject registration and management page interface



4. Teacher Assignment Management

This component facilitates the allocation of teachers to specific subjects and classes. It ensures that teaching responsibilities are properly managed and recorded within the system. The feature improves accountability and supports efficient coordination between teachers, subjects, and student classes.

Figure 23: Shows the teacher assignment management page interface



5. Examination and Grading Management

The system provides functionality for recording examination details and managing student grades. Teachers are able to enter, update, and manage assessment results for different examination types such as coursework, midterms, and final examinations. This component improves accuracy in academic evaluation and reduces errors associated with manual result processing.

Figure 24:Shows the examination registration management page interface

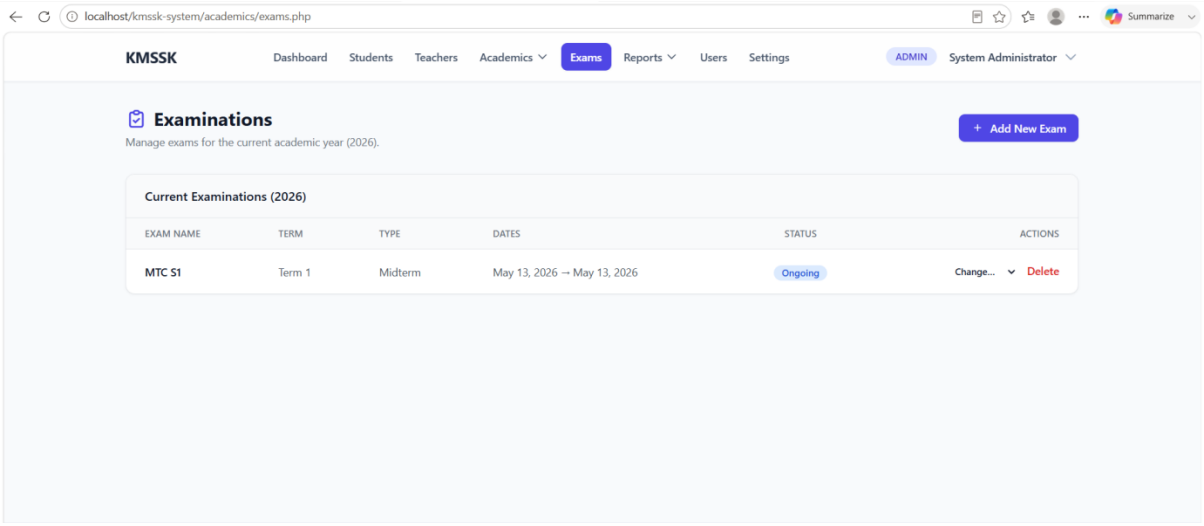


Figure 25: Shows the examination registration page form

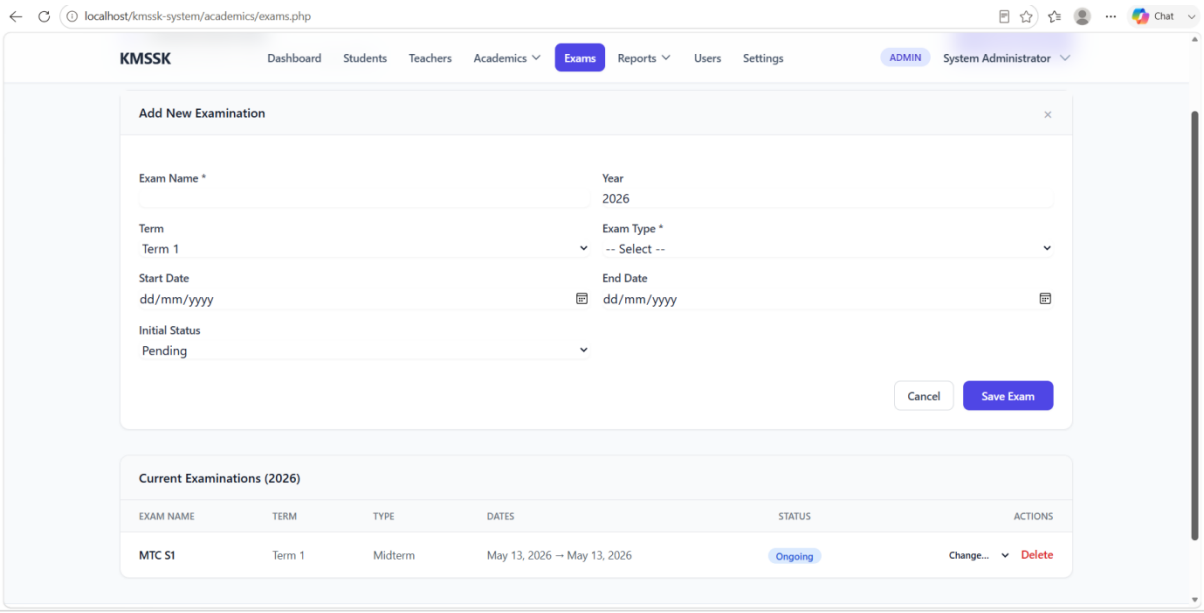
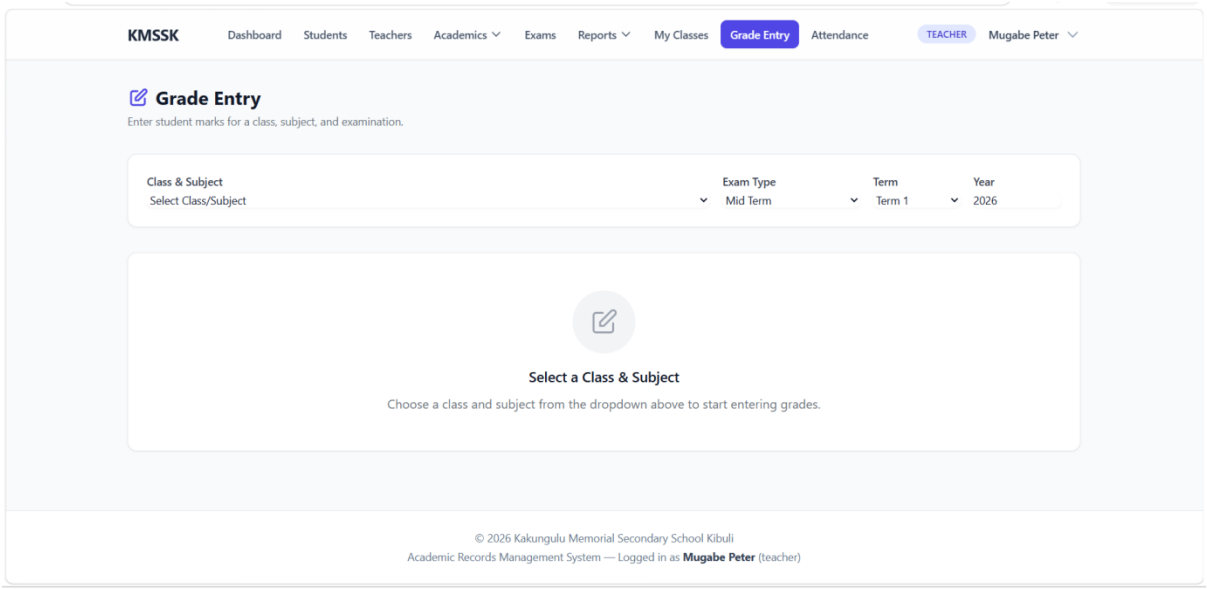


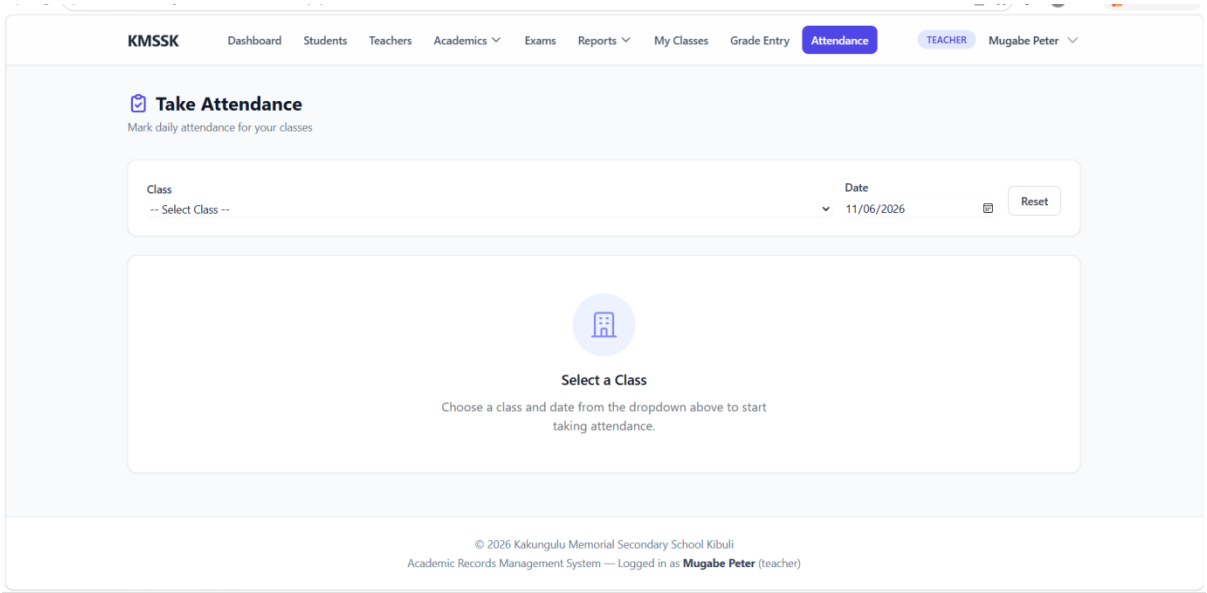
Figure 26:Shows the Teacher grade entry page for students



6. Attendance Management

An attendance management module is included to monitor and record student attendance. Teachers can record attendance status such as present, absent, late, or excused for each student. This component supports effective monitoring of student participation and academic discipline.

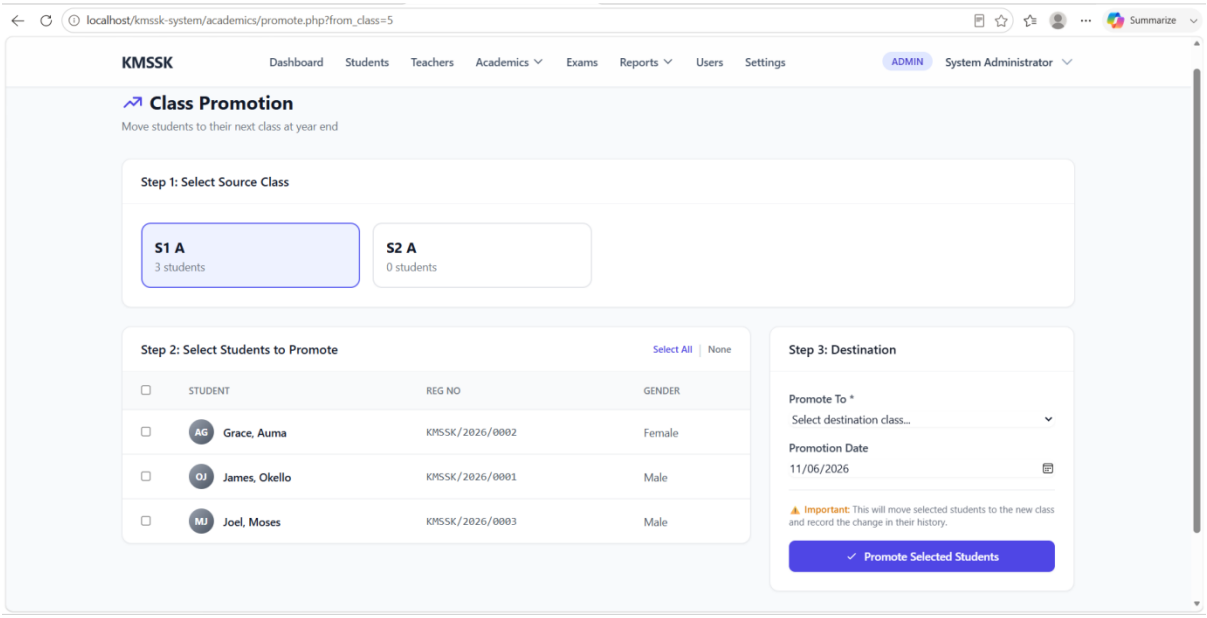
Figure 27: Shows the teacher attendance management page for students



7. Academic History Tracking

The system maintains a historical record of student class progression and academic performance over time. Through the student class history component, administrators can track changes in student enrollment and academic transitions across different classes and academic periods.

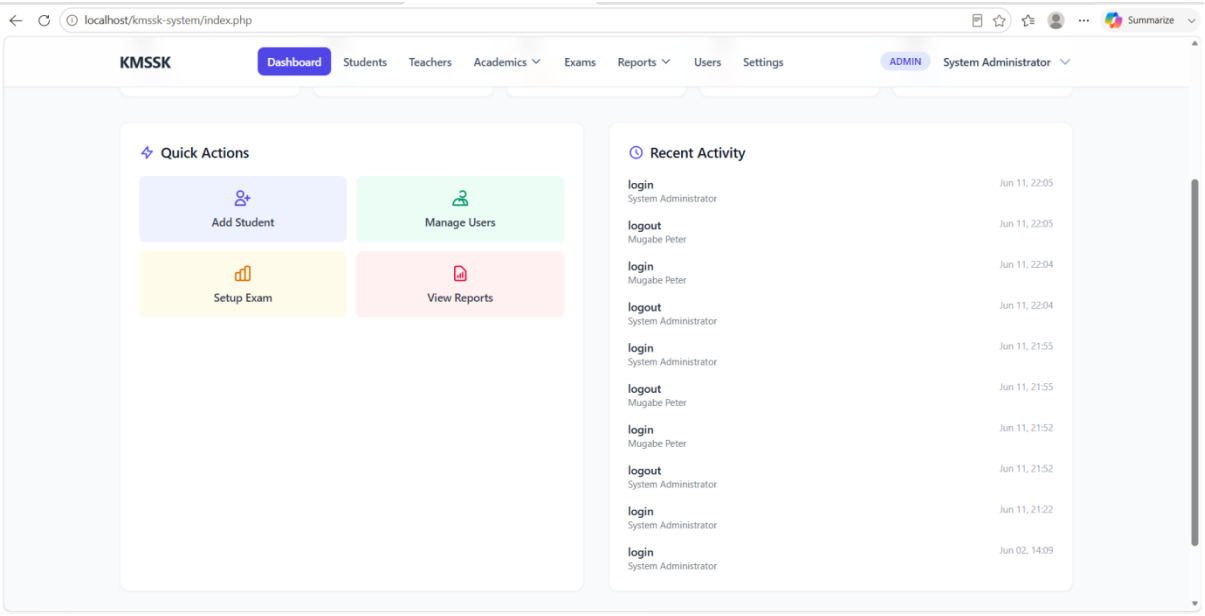
Figure 28: Shows the student academic history and promotion page interface



8. Audit Logging and Activity Monitoring

The system incorporates an audit logging feature that records user activities such as login attempts, data creation, updates, and deletions. This component enhances accountability, improves system transparency, and assists administrators in monitoring system usage and detecting unauthorized activities

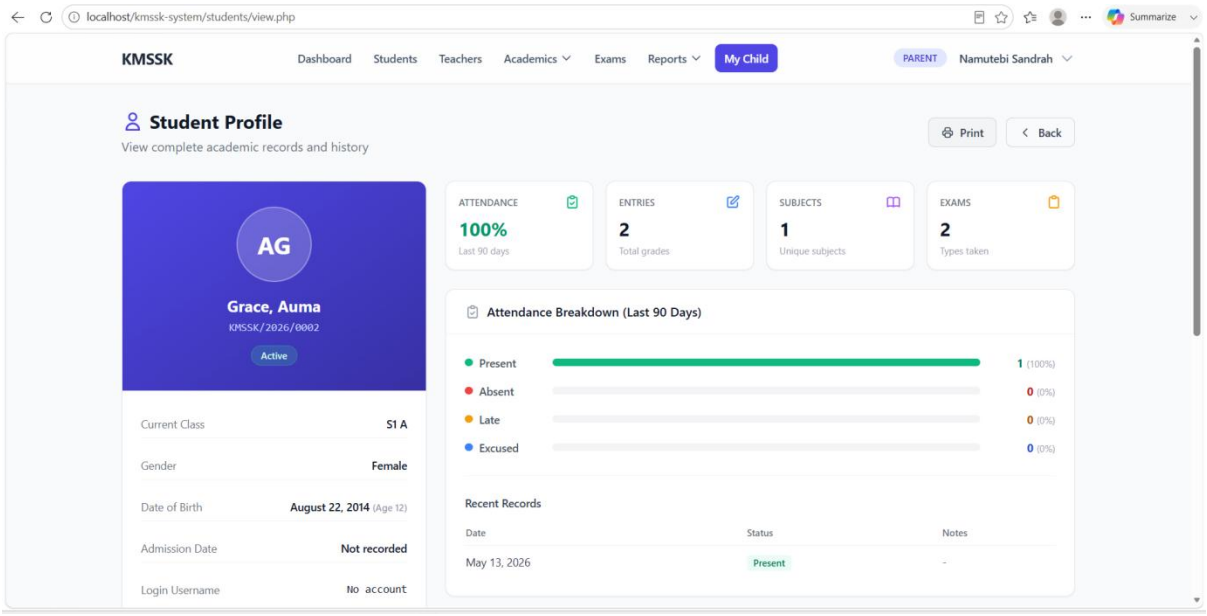
Figure 29: Shows the system audit and activity monitoring page interface



9. Parent Management Module

This component enables parents to access and monitor their children's academic information through the system. It allows parents to view student report cards, examination results, grades, attendance records, and academic progress reports in real time. The module also facilitates retrieval of historical academic records and performance summaries whenever required. By providing timely access to academic information, the component strengthens communication between parents and the school while promoting parental involvement in monitoring and supporting student performance.

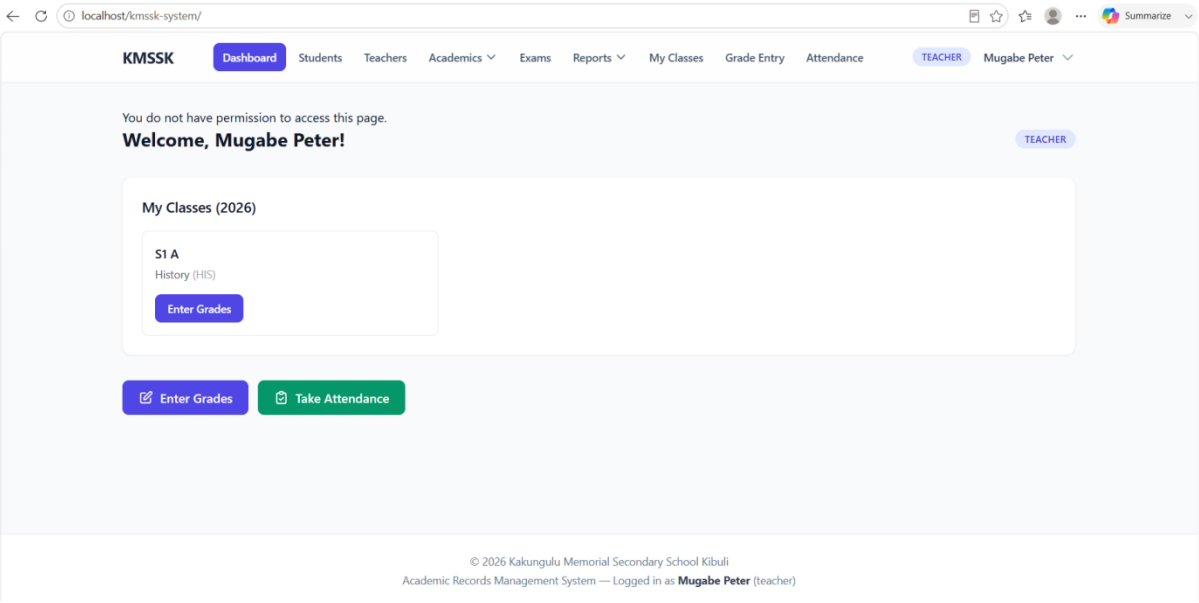
Figure 30: Shows the parent management module page interface



10. Teacher Management Module

This component enables teachers to manage and maintain students' academic information within the system. It supports the recording of student attendance, entry and updating of examination scores, continuous assessment marks, and academic remarks. The module also allows teachers to view assigned classes, monitor student academic progress, and generate performance-related reports. By automating academic record management processes, the component improves accuracy, reduces administrative workload, and ensures that student academic information remains current and readily accessible.

Figure 31: Shows the teacher management module page



11. Report Generation and Record Retrieval

The system automatically generates reports related to student performance, attendance, examination results, and other academic records. Reports can easily be viewed and retrieved to support academic decision-making and administrative planning. This component improves efficiency in preparing institutional records and academic summaries.

Figure 32:Shows the student report generation page interface

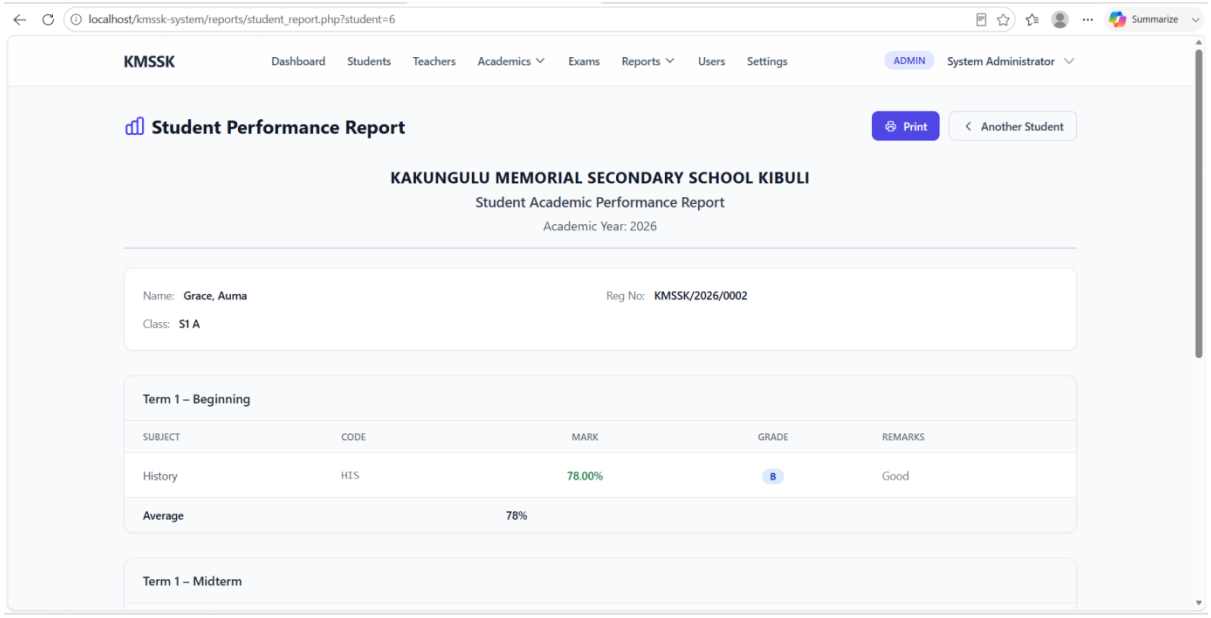


Figure 33: Shows the student report generation print view

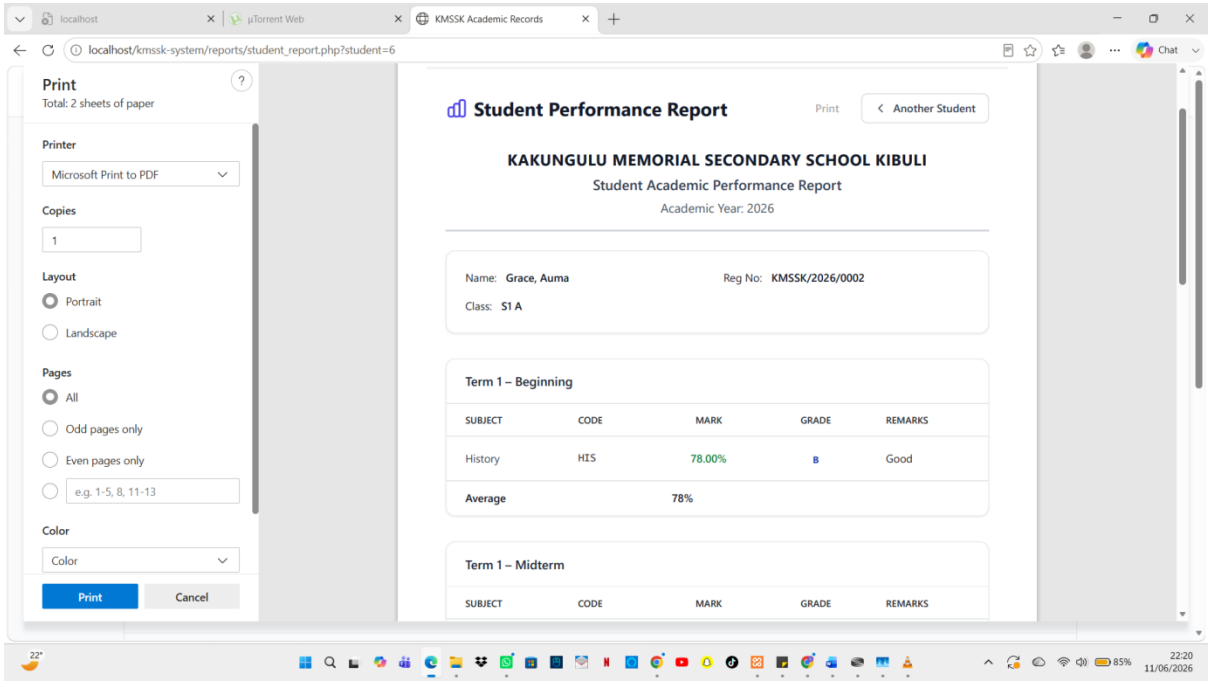
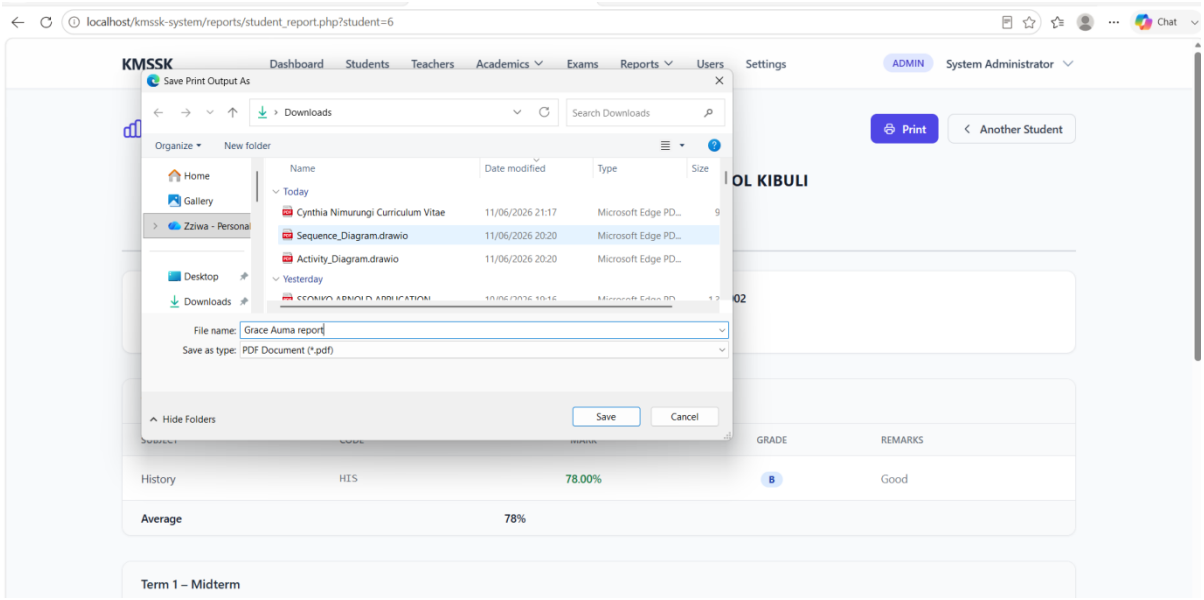


Figure 34: Shows the student report print export to pdf feature



CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATION

6.1 Introduction

This chapter presents the summary of the results, conclusions, and recommendations. The project set out to; find out the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli and their limitations, identify requirements for developing a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli, design and develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli and test and validate the developed database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli.

6.2 Summary

6.2.1 Existing Academic Records Management Practices and Their Limitations at Kakungulu Memorial Secondary School Kibuli

This objective was achieved through an assessment of the existing academic records management practices at Kakungulu Memorial Secondary School Kibuli. The findings established that the school primarily relies on paper-based record keeping, spreadsheet applications, manual report compilation, physical filing systems, and parent communication through meetings and printed report cards to manage academic information.

While these practices have supported academic operations over time, the study revealed several limitations. Academic records are maintained across multiple locations, including mark books, filing cabinets, and individual computer files, making information retrieval slow and inefficient. Students and parents often experience delays in accessing academic information because results must first be manually compiled and verified before dissemination.

The findings further revealed a high risk of errors and data inconsistencies resulting from manual calculations and fragmented record management practices. Teachers and administrators also spend considerable time processing examination results, preparing report cards, and verifying records, which increases workload and reduces operational efficiency. In addition, the existing system presents challenges related to data security, record preservation, and centralized coordination among departments.

The assessment demonstrated that the current academic records management practices are no longer sufficient to meet the growing information management needs of the school. These

findings provided strong justification for the development of a centralized database-driven academic records management system.

6.2.2 Requirements for Developing a Database-Driven Academic Records Management System

This objective was accomplished through a comprehensive requirements elicitation process involving administrators, teachers, records personnel, ICT staff, students, and parents. Data collected through interviews, questionnaires, and observations enabled the identification of both functional and non-functional requirements necessary for the developed system.

The findings revealed that stakeholders required functionalities such as student registration, automated marks entry and grade computation, attendance management, report card generation, academic performance reporting, role-based access control, parent access capabilities, and efficient search and retrieval of academic records. These requirements were identified as essential for addressing the inefficiencies associated with the existing manual processes.

The study also established several non-functional requirements necessary for effective system operation. These included system security, usability, reliability, scalability, maintainability, and performance. Stakeholders emphasized the need for a user-friendly interface, secure authentication mechanisms, and a centralized database environment capable of supporting multiple users and large volumes of academic records.

The requirements identified during this phase provided the foundation upon which the system architecture, database design, and implementation strategies were developed.

6.2.3 Design and Development of the Database-Driven Academic Records Management System

The third objective focused on the design and development of the database-driven academic records management system. Based on the requirements identified, a centralized system was developed to improve the management, storage, retrieval, and reporting of academic information within the school.

The system was designed using a three-tier architecture consisting of the presentation layer, application layer, and database layer. This architecture promoted separation of concerns, enhanced maintainability, and supported future scalability. A centralized relational database was developed to manage student records, attendance information, examination results, user accounts, and academic reports.

Several integrated modules were successfully developed, including the Student Registration Module, Academic Records Management Module, Attendance Management Module, Marks Processing and Grade Computation Module, Report Generation Module, and User Management Module. These modules collectively provide a comprehensive platform for managing academic records and supporting school administrative processes.

The system was developed using an iterative approach that enabled continuous refinement through stakeholder feedback and testing. The final solution addressed the major challenges identified during the assessment of existing academic records management practices.

6.2.4 Testing and Validation of the Developed System

The fourth objective focused on testing and validating the developed database-driven academic records management system within the operational environment of Kakungulu Memorial Secondary School Kibuli.

The pilot implementation demonstrated that the system effectively supports academic records management activities, including student registration, attendance management, marks entry, academic report generation, and records retrieval. Users were able to perform these activities successfully with minimal assistance.

Feedback obtained from administrators, teachers, and records personnel indicated that the system significantly improved records accessibility, reduced the time required to retrieve academic information, and minimized errors associated with manual record management. Participants also reported improvements in record accuracy, consistency, and overall administrative efficiency.

The testing process further confirmed that the system performed reliably under normal operating conditions. All major functionalities operated as expected, and the system consistently maintained data integrity and produced accurate outputs. The findings validated that the developed solution effectively addresses the challenges associated with the school's existing academic records management practices.

6.3 Conclusion

The project successfully achieved all the objectives that guided the development of the Database-Driven Academic Records Management System for Kakungulu Memorial Secondary School Kibuli.

The assessment of existing practices revealed significant limitations associated with paper-based and fragmented academic records management approaches, including delayed information access, data inconsistencies, excessive administrative workload, poor data security, and inadequate coordination among departments. These challenges highlighted the need for a modern and centralized records management solution.

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 database-driven academic records management system was successfully designed and developed using a centralized architecture and integrated modules that support student registration, attendance management, academic records processing, report generation, and user administration.

The testing and validation process confirmed that the developed system effectively improves the management of academic records by enhancing accessibility, increasing accuracy, strengthening data security, reducing administrative workload, and facilitating efficient decision-making. The system therefore provides a practical, reliable, and sustainable solution for academic records management at Kakungulu Memorial Secondary School Kibuli.

6.4 Recommendations

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

Continuous User Training

The school administration should provide regular training sessions for administrators, teachers, records personnel, and other users to ensure effective utilization of the system and improve user confidence when performing system-related tasks.

Full System Deployment

The developed system should be fully implemented across all academic departments and administrative units to maximize its benefits and eliminate dependence on paper-based records management practices.

Strengthening Data Backup and Recovery Mechanisms

The school should establish regular database backup procedures and disaster recovery mechanisms to safeguard academic records against accidental loss, system failures, or security incidents.

Infrastructure Improvement

The school should invest in reliable computer equipment, network infrastructure, and internet connectivity to support efficient system operation and accommodate future growth in user numbers and academic records.

Continuous System Maintenance

Regular system maintenance should be conducted to ensure optimal performance, address emerging technical issues, and implement software updates when necessary.

Enhanced Security Measures

Additional security measures such as password policies, user activity monitoring, access control reviews, and periodic security audits should be implemented to further protect sensitive academic information.

Future System Integration

The school should consider integrating the system with other institutional information systems such as finance management, library management, and learning management systems to create a comprehensive school information management environment.

Periodic System Evaluation

Regular evaluations should be conducted to assess system effectiveness, identify opportunities for improvement, and ensure continued alignment with the academic and administrative needs of the school.

6.4.1 Future Work

The following future enhancements are recommended:

- Integration with UNEB databases for automatic examination result synchronization.
- SMS notification services for parents regarding attendance, performance, and disciplinary issues.

- Mobile application development for Android and iOS access.
- Integration with school finance and fee management systems.
- Integration with library management systems.
- AI-based academic performance prediction and analytics.
- Cloud-based deployment for multi-campus access.
- Biometric attendance integration.
- Online student admission and enrollment module.
- Real-time email and push notification services.

REFERENCES

AccessCorp. (2024). *Embracing technology for success: Navigating records management challenges in education*. https://www.accesscorp.com/blog/embracing-technology-for-success-navigating-records-management-challenges-in-education/

African Development Bank. (2024). *African economic outlook 2024*. https://www.afdb.org/en/documents/african-economic-outlook-2024

Al-Fraihat, D., Joy, M., Masa'deh, R., & Sinclair, J. (2023). Evaluating information systems success in educational environments: A systematic review. *Education and Information Technologies, 28*(4), 3811–3842.

Ampaire, A., Esaete, J., & Kobusingye, L. K. (2025). Integration of information communication technology in education in Ugandan secondary schools: Prospects for improved academic performance. *East African Journal of Information Technology, 8*(1). https://doi.org/10.37284/eajit.8.1.3232

Angela, G. (2026). Academic registry records management and related policies in African higher education institutions: An empirical review. *East African Journal of Education Studies, 9*(1), 713–724. https://doi.org/10.37284/eajes.9.1.4579

Beckworth, C. A., Anguyo, R., Kyakulaga, F. C., Lwanga, S. K., & Valadez, J. J. (2016). Can local staff reliably assess their own programs? A confirmatory test–retest study of lot quality assurance sampling data collectors in Uganda. *BMC Health Services Research, 16*(1), Article 396. https://doi.org/10.1186/s12913-016-1645-9

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27–40.

British Psychological Society. (2021). *Code of human research ethics*. British Psychological Society.

Chigbu, U. E., Atiku, S. O., & du Plessis, C. C. (2023). The science of literature reviews: Searching, identifying, selecting, and synthesising. *Publications, 11*(1), Article 2. https://doi.org/10.3390/publications11010002

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

de Brock, B. (2023). *Developing information systems accurately: A wholistic approach*. Springer.

Elmasri, R., & Navathe, S. B. (2016). *Fundamentals of database systems* (7th ed.). Pearson.

Guest, G., Namey, E. E., & Mitchell, M. L. (2013). *Collecting qualitative data: A field manual for applied research*. Sage.

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing, 72*(12), 2954–2965.

Kataike, R., Turyahabwe, R., Owomugisha, E., & Mbabazi, F. (2025). Records management practices and school management decisions in selected secondary schools in Kibuku District, Eastern Uganda. *East African Journal of Education Studies, 8*(2), 668–684. https://doi.org/10.37284/eajes.8.2.3149

Katekwe, P., & Mutsagondo, S. (2018). Challenges and prospects of records maintenance in public departments: The case of the Midlands Province, Zimbabwe. *Journal of Librarianship and Information Science, 50*(4), 392–399. https://doi.org/10.1177/0266666917712336

Kyoshabire, P., Bahati, R., & Kintu, D. (2023). The relationship between ICT utilization and records management in secondary schools of Sheema District. *American Research Journal of Humanities & Social Science.*

Laudon, K. C., & Laudon, J. P. (2023). *Management information systems: Managing the digital firm* (17th ed.). Pearson.

Mandizha, P. (2024). Schools' records management also matters: An information governance maturity assessment of a secondary school in Zimbabwe. *Library Philosophy and Practice*, Article 1696.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage.

Ministry of Education and Sports. (2023). *Annual performance report FY 2022/23*. https://www.education.go.ug/wp-content/uploads/2024/01/MoES-APR-2022-23-Final.pdf

Muhammad, K., Barigayomwe, R., Zulaika, N., & Daphine, A. (2022). The efficiency of records management in selected private and public secondary schools in urban districts of Central Uganda. *East African Journal of Education Studies, 5*(4), 141–152. https://doi.org/10.37284/eajes.5.4.996

Mukred, M., & Yusof, Z. M. (2020). Electronic records management maturity model: A critical literature review. *Records Management Journal, 30*(3), 295–319.

Obaro, G. O., & Obaro, I. D. (2016). Challenges facing records management in the Institute of Education, Delta State University, Abraka. *Nigerbiblios: Journal of the National Library of Nigeria, 24*(1–2), 11–19.

OECD. (2023). *OECD digital education outlook 2023: Towards an effective digital education ecosystem*. OECD Publishing. https://doi.org/10.1787/c74f03de-en

Opiro, R., Atibuni, Z., & Sekiwu, Y. (2018). Efficacy of information and communication technology (ICT) in the digital management of student records in universities in Eastern Uganda. In *Academic records management practices in African higher education institutions*. https://abjournals.org/bjce/wp-content/uploads/sites/20/journal/published_paper/volume-5/issue-1/BJCE_JRYJWENT.pdf

Orb, A., Eisenhauer, L., & Wynaden, D. (2001). Ethics in qualitative research. *Journal of Nursing Scholarship, 33*(1), 93–96.

Ouma, G., & Namusonge, M. (2022). Electronic records management practices and institutional efficiency in educational institutions in East Africa. *Journal of Information and Knowledge Management, 13*(2), 45–58.

Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage.

Penn, I. A., & Pennix, G. B. (2017). *Records management* (3rd ed.). Rowman & Littlefield.

PowerSchool. (2025). *Student information systems (SIS): A guide for K–12 school districts*. https://www.powerschool.com/blog/k12-student-information-systems/

Pressman, R. S., & Maxim, B. R. (2020). *Software engineering: A practitioner's approach* (9th ed.). McGraw-Hill Education.

Resnik, D. B. (2020). *What is ethics in research & why is it important?* National Institute of Environmental Health Sciences. https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm

SchoolMonitor Uganda. (2024). *Running a school in Uganda is hard; School Monitor software makes it simple*. https://schoolmonitor.net/running-a-school-in-uganda-is-hard-school-monitor-software-makes-it-simple/

Silberschatz, A., Korth, H. F., & Sudarshan, S. (2019). *Database system concepts* (7th ed.). McGraw-Hill Education.

Skolera. (2025). *The importance of students information systems in schools*. https://skolera.com/en/blog/students-information-system/

Syed, A. R., et al. (2025). An efficient database-driven school management system for enhanced educational administration. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.5391447

UNESCO. (2023). *Global education monitoring report 2023: Technology in education—A tool on whose terms?* UNESCO.

vmedulife. (2025, October 9). *Student data management systems: Transforming campus administration with vmedulife*. https://vmedulife.com/blog/academic-planning/student-data-management-systems-transforming-campus-administration-with-vmedulife/

World Bank. (2023). *The state of global learning poverty: 2023 update*. World Bank.

Yidana, P., & Akuna, E. (2025). Academic records management practices in African higher education institutions: An empirical review. *British Journal of Contemporary Education, 5*(1), 93–113. https://doi.org/10.52589/BJCE-JRYJWENT

APPENDICES

Annex 1: Semi-Structured Interview Guide for School Staff (Teachers & Administrators)

Introduction

Dear Sir/Madam,

We are Bachelor of Library and Information Science (BLIS) year three students working on a project to develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. Your experiences and suggestions are incredibly valuable to us, and by sharing your thoughts, you will be helping us make meaningful changes that can enhance school administration and academic performance.

Please know that everything you share will remain completely confidential and anonymous. This interview will only take a few minutes of your time, and we truly appreciate your willingness to participate.

Thank you for your time and for helping us make a difference.

Section 1: Awareness and Use of Current Records Management

1. Are you aware of the existing academic records management practices at Kakungulu Memorial Secondary School?
2. Have you ever encountered challenges in accessing or updating student records (such as admissions, grades, attendance)?
3. How easy or difficult is it to manage and retrieve academic records currently?

Section 2: Perceptions of Current Records Management System

4. What do you think about the current methods for managing academic records?
5. Do you feel that the current system supports effective school administration and decision-making?
6. What improvements would you suggest for the existing records management practices?

Section 3: Expectations for a Database-Driven Records Management System

7. How likely are you to use a centralized database system for academic records (such as for attendance, grades, timetables)?
8. What key features would you like to see in a database-driven system (such as automated reports, data security, multi-user access)?

9. Where or how would you prefer to access this database system (such as web portal, mobile app, school computers)?

Section 4: Incentives and Motivation

10. What would encourage you to adopt and use a new database-driven records system more effectively?
11. Would you prefer to receive training or updates on how the system improves school operations? If yes, how?

Section 5: Additional Suggestions

12. Do you have any other suggestions for improving academic records management at Kakungulu Memorial Secondary School?
13. Is there anything else you would like to share about records management challenges or opportunities at the school?

Annex 2: Semi-Structured Interview Guide for Parents and Students

Introduction

Dear Sir/Madam / Dear Student,

We are Bachelor of Library and Information Science (BLIS) Year Three students conducting a study aimed at developing a database-driven academic records management system for Kakungulu Memorial Secondary School, Kibuli.

The purpose of this interview is to gather your experiences, perceptions, and expectations regarding the management and accessibility of academic records. Your input will help inform the design of a system that improves efficiency, transparency, and access to academic information.

Participation in this study is voluntary. All responses will be treated with strict confidentiality and used solely for academic purposes. No personal identifiers will be included in the final report.

Thank you for your time and valuable contribution.

Section 1: Awareness and Access to Academic Records

For Parents:

1. Are you aware of how the school currently manages and communicates students' academic records (such as report cards, meetings)?
2. How do you usually access your child's academic information?
3. Have you ever experienced delays or challenges in receiving your child's academic records? Please explain.

For Students:

4. Are you aware of how your academic records (such as grades, attendance) are kept and managed at school?
5. How do you usually receive information about your academic performance?
6. Have you ever faced difficulties accessing your academic results or records?

Section 2: Perceptions of Current Records Management Practices

For Parents:

7. What is your opinion of the current methods used by the school to manage and share academic records?
8. Do you consider the information provided to be timely, accurate, and sufficient?
9. What challenges have you experienced with the current system?

For Students:

10. How do you feel about the current way the school provides your academic results and records?
11. Do you receive your results on time and in a clear format?
12. What difficulties, if any, have you experienced with the current system?

Section 3: Expectations for a Database-Driven Records Management System

For Parents:

13. Would you be willing to use a digital system to access your child's academic records?
14. What type of information would you expect to access (such as grades, attendance, teacher comments)?
15. What concerns would you have regarding such a system (such as privacy, ease of use, accessibility)?

For Students:

16. Would you be interested in accessing your academic records through a digital platform?
17. What features would you find most useful (such as instant results, performance tracking)?
18. What challenges might you face in using such a system?

Section 4: Adoption, Usability, and Support

For Parents:

19. What factors would encourage you to regularly use a digital academic records system?

20. Would you require any support or training to use the system? If yes, in what form?

For Students:

21. What would motivate you to actively use a digital system for tracking your academic progress?
22. Would you need any guidance or support to use such a system effectively?

Section 5: Additional Suggestions and Views

For Parents and Students:

23. What suggestions do you have for improving the management and accessibility of academic records at the school?
24. What benefits do you think a digital records management system could bring?
25. Are there any concerns or risks you think the school should consider before implementing such a system?
26. Is there anything else you would like to share regarding academic records management?

Annex 3: Document review guide

List of documents that will be reviewed and cross-referenced in quantitative data collection:

School management reports including annual academic performance reports, examination results summaries, and student progression tracking reports

School policies and procedures manuals such as academic records management procedures, student admission protocols, examination regulations, and data security policies

Strategic Plans and Frameworks specifically Kakungulu Memorial Secondary School strategic plans, academic development plans, and Information Computer Technology integration roadmap

Peer-reviewed articles such as studies on school records management systems, research on academic database implementations, and articles on student information systems in secondary schools

Government and regulatory guidelines like Ministry of Education and Sports guidelines on academic records management, data protection regulations for educational institutions, and Uganda National Examinations Board record-keeping requirements

Training materials and guides such as staff training manuals on records management, teacher guidelines for grade submission, and user guides for existing student information systems

Internal communication records including staff meeting minutes related to academic records improvements, memos addressing examination processing delays, and academic committee reports

Student records archives such as historical admission registers, examination results databases, attendance logs, disciplinary records, and transfer documentation

Annex 4: Questionnaire 1: Users (Teachers & Administrative Staff)

Database-Driven Academic Records Management System Survey

Kakungulu Memorial Secondary School Kibuli

Introduction

Dear Teacher/Staff Member,

We are finalist year students pursuing a Bachelor of Library and Information Science degree from Makerere University working on a project to develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. Your input is crucial to help us understand current challenges and design a system that improves efficiency and academic management. This short survey will take only a few minutes, and all responses will remain confidential and anonymous. Thank you for your time and for helping us enhance school operations.

Section 1: Background Information

Age Group

Under 25

25–35

36–45

46–60

Above 60

Gender

Male

Female

Prefer not to say

Role at Kakungulu Memorial Secondary School

Teacher

Records Officer

Administrative Staff

ICT Staff

Other, please specify:

Years Working at the School

Less than 1 year

1–3 years

3–5 years

More than 5 years

Section 2: Experience with Current Records Management System

How do you currently access or update student academic records (grades, attendance, transcripts)?

Manual paper registers

Excel spreadsheets/shared drives

Basic school management software

Other, please specify:

How often do you face delays or errors when retrieving or updating academic records?

Always

Often

Sometimes

Rarely

Never

Section 3: Perceptions of Current System and Database Solution

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

The current manual records system is frustrating and often leads to errors in academic data.

1 □ 2 □ 3 □ 4 □ 5 □

I find it inconvenient to rely on paper records or scattered digital files for academic management.

1 □ 2 □ 3 □ 4 □ 5 □

A database-driven records system would be too complicated for me to use effectively.

1 □ 2 □ 3 □ 4 □ 5 □

I believe a centralized database system could make records management faster and more reliable.

1 □ 2 □ 3 □ 4 □ 5 □

I worry that a database system might risk losing important academic data or student privacy.

1 □ 2 □ 3 □ 4 □ 5 □

Section 4: Impact and Expectations

How have current records management delays or errors affected teaching effectiveness or school administration?

If a database system fails to reduce data retrieval time as promised, how would that impact your willingness to adopt it?

Do you think a database system might exclude staff who are not comfortable with technology, and if so, what could be done?

Section 5: Suggestions for the Proposed Database System

What features would you like to see in a database-driven academic records system? (Select all that apply)

Real-time grade entry and updates

Automated report generation (transcripts, class lists)

Easy search and filtering of student records

Secure access controls by user role

Mobile access for teachers

Backup and data recovery features

Other, please specify:

Do you have any additional suggestions or concerns about implementing a database records system?

Closing:

Thank you for taking the time to complete this survey**.**

Annex 5: Questionnaire 2: Students & Parents

Database-Driven Academic Records Management System Survey

Kakungulu Memorial Secondary School Kibuli

Introduction

Dear Student/Parent,

We are finalist year students pursuing a Bachelor of Library and Information Science degree from Makerere University working on a project to develop a database-driven academic records management system for Kakungulu Memorial Secondary School Kibuli. Your input is crucial to help us design a system that improves access to academic information. This short survey will take only a few minutes, and all responses will remain confidential and anonymous. Thank you for your time.

Section 1: Background Information

Age Group (Student/Parent)

Under 18 (Student)

18–30

31–45

46–60

Above 60 (Parent)

Gender

Male

Female

Prefer not to say

Category

Student

Parent

Current Class (if student)

S1-S4

S5-S6

Other:

Number of Children at School (if parent)

One child

2-3 children

Section 2: Experience with Current Records Access

How do you currently access your academic records or your child's records (results, attendance, reports)?

Collect physical report cards

Phone calls to school

Through teachers

Other, please specify:

How often do you face delays in receiving academic reports or results?

Always

Often

Sometimes

Rarely

Never

Section 3: Perceptions of Current System and Database Solution

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Getting academic records currently takes too long and is unreliable.

1 □ 2 □ 3 □ 4 □ 5 □

I would prefer digital access to my/our academic records over paper reports.

1 □ 2 □ 3 □ 4 □ 5 □

I would find a database system too difficult to use for checking records.

1 □ 2 □ 3 □ 4 □ 5 □

A database system would help me track academic progress more easily.

1 □ 2 □ 3 □ 4 □ 5 □

I am concerned about the security of personal academic information in a digital system.

1 □ 2 □ 3 □ 4 □ 5 □

Section 4: Impact and Expectations

How have delays in accessing academic records affected your studies or parental involvement?

If the database system is not user-friendly, how would that impact your/our engagement with school records?

Do you think some students/parents might be excluded from using a digital system? If yes, how can this be addressed?

Section 5: Suggestions for the Proposed Database System

What features would make a database system most useful for students/parents? (Select all that apply)

Online access to results and reports

Parent/student login portals

SMS notifications for results

Progress tracking dashboards

Downloadable transcripts

Other, please specify:

Do you have any additional suggestions for improving access to academic records?

Closing remarks:

Thank you for taking the time to complete this survey.

Annex 6: Observation Checklist for Academic Records Management Practices

Introduction

This observation checklist is designed to systematically capture real-time activities, workflows, and interactions related to academic records management at Kakungulu Memorial Secondary School. The checklist will guide the researcher in documenting how records are created, processed, stored, retrieved, and used across different user groups (administrators, teachers, and students).

The observation will be non-participant and conducted without interfering with normal operations.

Section A: General Information

Date of Observation: ……

Time: ……

Location (Tick as appropriate):

Administration Office

Staff Room

Classroom

Records Office

Other (Specify): ……**...**

Observer Name: ……

Section B: Records Creation and Data Entry

Activity Observed	Yes	No	Comments
Student academic data (such as marks, attendance) is recorded regularly			
Data entry is done manually (paper-based)			
Data entry uses any digital tools (such as spreadsheets)			
Standard formats/templates are used for recording data			
Errors are noticed during data entry			
Data entry process is time-consuming			

Section C: Records Storage and Organization

Activity Observed	Yes	No	Comments
Records are stored in physical files			
Records are stored digitally			
Storage system is well-organized and labelled			
Records are easy to locate when needed			
There is evidence of misplaced or missing records			
Backup systems (physical/digital) exist			

Section D: Records Retrieval and Access

Activity Observed	Yes	No	Comments
Records retrieval takes a short time			
Delays are experienced when retrieving records			
Multiple staff are involved in retrieving records			
Unauthorized access to records is possible			
Access to records is restricted and controlled			

Section E: Records Updating and Reporting

Activity Observed	Yes	No	Comments
Records are updated regularly			
Updates are done manually			
Reports (such as report cards) are generated manually			
Report preparation takes a long time			
Errors are observed in reports			

Section F: Workflow Efficiency and Challenges

Observation Area	Yes	No	Comments
Workflow processes appear efficient			
Bottlenecks or delays are observed			
Duplicate work or redundancy exists			
Communication gaps are evident			
Inconsistencies between procedures and practice			

Section G: Data Security and Integrity

Activity Observed	Yes	No	Comments
Records are securely stored			
Access control measures are in place			
Risk of data loss or damage is evident			
Confidentiality of student information is maintained			

Section H: Additional Observations

What major challenges were observed?

……

What inefficiencies were identified?

……

Any notable best practices?

……

General comments:

……

Appendix 7: Introduction Letter for the Project

MAKERERE UNIVERSITY

P.O.Box 7062 Kampala Uganda
Email: info@cis.mak.ac.ug
URL: http://www.cis.mak.ac.ug

Tel: +256 - 392 - 000 - 180
Fax: +256 - 414 540 620
twitter: @cocismak
facebook: makcocis

COLLEGE OF COMPUTING & INFORMATION SCIENCES

EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE (EASLIS)

5th May, 2026

The Deputy Head Teacher
Kakungulu Memorial Secondary School Kibuli
P. O. Box 25719 Kampala
Uganda

Dear Sir/Madam,

RE: INTRODUCTION LETTER

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

1.	Kisakye Deborah	23/U/10005/EVE
2.	Ddamulira Denis	23/U/07973/EVE
3.	Kateregga David	23/U/709249/PS
4.	Kizito Shukurah Bidin	23/U/13644/EVE
5.	Nakazibwe Doreen	23/U/13644/EVE

As part of their degree programme, they are entitled to carry out a project under the course: BLS 3227: Information Science Project. The title of their project is "***A Database-Driven Academic Records Management System for Kakungulu Memorial Secondary School, Kibuli.***"

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 8: 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*