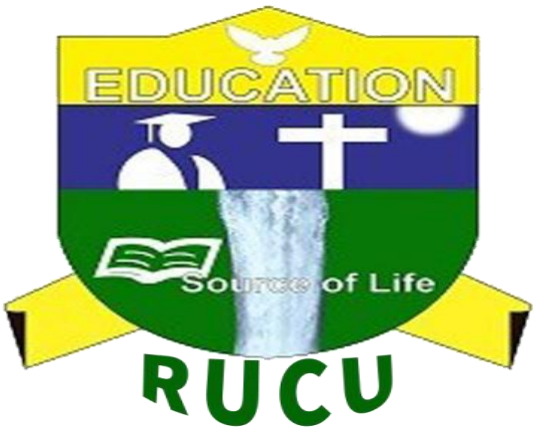
RUAHA CATHOLIC UNIVERSITY

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE



PROJECT PHASE: PROJECT PROPOSAL

TITLE: RUCU INTEGRATED LEARNING PORTAL

SUBMITTED BY:

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CHAPTER ONE
INTRODUCTION

1.1 Background

A management system refers to an organized framework of processes, technologies, and procedures designed to collect, manage, process, and distribute information to support decision-making and operational efficiency within an institution [1]. Management systems play a vital role in modern organizations by improving coordination, reducing manual work, enhancing data accuracy, and enabling transparency in daily operations. These systems are widely applied across different sectors including healthcare, finance, manufacturing, government services, and the academic sector. In education, management systems help institutions handle student records, academic performance, communication, scheduling, and administrative processes in a structured and efficient manner [3].

Globally, the academic sector has experienced significant transformation through the adoption of digital management systems. Universities in Europe, North America, and Asia have integrated Learning Management Systems (LMS) and Academic Management Systems to automate course registration, grading, project supervision, and academic reporting. These systems have improved efficiency, reduced paperwork, and enabled real-time access to academic information for students, lecturers, and administrators. In African countries, the adoption of academic management systems has also increased, especially after the rise of digital learning initiatives. In Tanzania, several higher learning institutions such as the University of Dar es Salaam and other universities have implemented digital academic platforms to enhance service delivery and academic governance [2]. These systems have improved communication, streamlined academic workflows, and strengthened record management. Despite these transformations, academic institutions still face several operational and administrative challenges.

Some of the persistent challenges include fragmented academic records, delays in processing results, poor coordination of project supervision, limited tracking of fieldwork activities, and lack of centralized data for decision-making. Researchers and institutions have attempted to address these issues by introducing various academic management and learning systems. However, many existing systems still operate as separate modules or fail to fully integrate all academic processes into a single unified platform. This results in inefficiencies, duplication of data, and limited transparency [1]. At Ruaha Catholic University (RUCU), particularly in the

Faculty of Information and Communication Technology (ICT), academic processes such as project supervision, fieldwork tracking, coursework management, and academic reporting are still handled through fragmented tools like spreadsheets, emails, and manual documentation. This fragmentation creates delays in evaluation processes, difficulties in monitoring academic progress, and limited access to timely academic information for students and staff. Therefore, this study is going to develop RUCU Integrated Learning Portal that will unify academic processes, enhance transparency, and support data-driven decision-making.

1.2 Introduction

The RUCU-ILP is a web-based academic management system designed to integrate student data, coursework, project supervision, fieldwork tracking, and public communication into a single platform. It aims to replace manual and disconnected processes with automated, role-based workflows accessible to students, lecturers, and administrators. The system is built using the MVC architecture, with PHP and MySQL for backend operations, and Bootstrap for responsive frontend design. It will be hosted on an Apache server within the RUCU ICT infrastructure. This proposal outlines the conceptualization, design, and implementation plan for RUCU-ILP, aligning with RUCU's strategic goal of becoming a digitally transformed institution by 2030 [4].

1.3 Problem Statement

Academic management systems have become essential tools in higher learning institutions worldwide, supporting the automation of academic records, student performance tracking, project supervision, and administrative coordination. Many universities have adopted digital platforms to improve efficiency, transparency, and data accessibility. These systems are known to reduce paperwork, minimize errors, and enhance communication between students, lecturers, and administrators.

However, despite the presence of these systems and the known benefits of academic digitalization, many institutions still experience operational inefficiencies due to fragmented or partially implemented solutions. At Ruaha Catholic University (RUCU), particularly within the Faculty of Information and Communication Technology (ICT), academic processes such as coursework management, project supervision, fieldwork tracking, and academic reporting are handled using disconnected tools including spreadsheets, emails, and manual documentation. This situation leads to delays in evaluation, difficulty in monitoring student academic progress, duplication of records, and limited access to timely and accurate academic information.

While academic management technologies exist, there is still a gap in providing a fully integrated platform that unifies these academic processes into a single, centralized system tailored to the needs of RUCU. What remains insufficiently addressed is how an integrated academic portal can streamline workflows, improve transparency, and support data-driven academic decision-making within the university context. Therefore, this study proposes to design and develop the RUCU Integrated Learning Portal (RUCU-ILP) to address these challenges by centralizing academic operations into one cohesive digital system.

1.4 objectives

1.4.1General Objectives

The general objective of RUCU-ILP is to digitize, integrate, and streamline all academic and administrative processes within the ICT Faculty through a secure, user-friendly web portal.

1.4.2 Specific Objectives

1. To identify functional and non-functional requirements for a proposed academic management system
2. To design and implement a centralized digital academic management system
3. To evaluate the effectiveness of the implemented system using parameters such as process efficiency, error reduction, level of automation, and user satisfaction

1.6 Research Questions

1. What are the functional and non-functional requirements for a proposed academic management system?
2. How can a centralized digital academic management system be designed and implemented?
3. What is the effectiveness of the implemented system?

1.7 Significance of the Study

The implementation of the RUCU-ILP system is expected to deliver significant benefits to multiple stakeholders within the university community. Students will gain instant and convenient access to their academic information, including marks, project progress, and fieldwork records, thereby improving transparency and self-monitoring of academic activities. Lecturers will benefit from a reduced administrative workload through automated processes for marking, project supervision, and record management, allowing them to focus more on

teaching and research. Administrators will experience enhanced institutional oversight through accurate, real-time reporting and analytics, which will support informed planning and decision-making. At the institutional level, the university will strengthen its academic credibility by aligning with digitalization policies, improving data integrity, and ensuring reliable management of academic records and processes.

1.7 Scope of the Study

The proposed system focuses on delivering core digital functionalities that support academic, administrative, and institutional operations. The in-scope functional areas include academic management features such as student and lecturer registration, program and course configuration, assessment creation, marks entry, and automated grade computation. The system will also support project management processes, including student group formation, project phase tracking, document submission, supervisor and panellist assignment, evaluation, and defence scheduling. Furthermore, the system will incorporate fieldwork management capabilities, enabling field station requests, digital logbook entries, progress monitoring, and evaluations by field officers. A public-facing web platform will be developed to showcase faculty activities and selected academic outputs while supporting internal staff workflows.

However, to maintain focus and feasibility, several features are excluded from the scope of this study. These include the development of chat or messaging systems, SMS reminders and calendar synchronization, digital certificate generation, and integration with external university systems.

1.8 Short Summary

This chapter has introduced the background, problem statement, objectives, significance, and scope of the RUCU-ILP project. The system aims to transform academic operations at RUCU's ICT Faculty by centralizing workflows, automating tasks, and enhancing data accessibility. The following chapters will review related works, identify research gaps, and outline the methodology for system development.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter defines the core concepts, establishes the purpose of the review, and critically examines the landscape of existing systems. It begins by defining an Integrated Learning Portal as a unified digital ecosystem designed to consolidate academic, administrative, and communicative functions of an educational institution into a single, coherent platform. Such systems are distinguished from basic Learning Management Systems (LMS) by their broader scope, aiming to manage the entire student academic lifecycle from enrolment and coursework to project supervision, fieldwork, and graduation logistics.

The purpose of this review is threefold: first, to survey the technological and pedagogical foundations of academic management systems; second, to analyse empirical evidence of their implementation, challenges, and benefits, particularly in the African higher education context; and third, to identify a specific research gap that the RUCU Integrated Learning Portal (RUCU-ILP) is designed to fill. This analysis will position RUCU-ILP within the continuing of educational technology development.

The evolution of academic systems reveals a persistent challenge: Early digital solutions often addressed isolated processes (e.g., course delivery via LMS or student records via MIS), creating data silos and inefficient workflows. As highlighted in studies from Tanzanian universities [13], a common scenario is the coexistence of a digital LMS with entirely manual processes for project and fieldwork management. This fragmentation leads to significant administrative burdens, inconsistent data, and poor stakeholder experience. The proposed solution, embodied by the RUCU-ILP, is a deliberately architected, faculty-specific platform that moves beyond this fragmented model. It seeks to solve these challenges by integrating all critical academic workflows course management, project supervision, and fieldwork coordination into a single, role-based portal, thereby eliminating silos, automating manual tasks, and providing a unified source of truth for academic data.

2.2 Empirical Studies

The empirical evidence for digital learning systems in higher education, particularly within the African context, reveals a trajectory of adoption, challenges, and incremental improvements. The following case studies are presented in chronological order to illustrate this evolution.

2.2.1 Early Adoption and Measured Benefits

Initial studies focused on quantifying the baseline impact of introducing Learning Management Systems (LMS). For instance, an evaluation at the University of Nairobi [11] demonstrated that LMS adoption led to a measurable 35% increase in student engagement metrics and a 50% reduction in time spent on routine administrative tasks. This study was pivotal in establishing the core value proposition of digital systems for improving efficiency and learner interaction. A contemporaneous case study at the University of Ghana [12] further highlighted systemic benefits, reporting that centralized academic platforms enhanced operational transparency and contributed to a measurable decline in examination malpractice. These early works provided a foundation for justifying institutional investment in digital infrastructure.

2.2.2 Recent Focus on Specialization and Integration

The latest phase of development reflects attempts to move beyond generic LMS functions toward more specialized and integrated solutions. Institutional portals, such as the one at Kenyatta University [15], began incorporating modules for project tracking, indicating recognition of the need to digitize this key academic function. However, as literature indicates, these systems often remain siloed. The persistent challenge is the lack of a unified platform that seamlessly connects disparate academic activities, from coursework to project defence to fieldwork a gap that the RUCU-ILP project directly engages with.

2.3 Related Works

Several academic management systems have been implemented across higher education institutions, each addressing different aspects of academic and administrative workflows. Moodle is a widely adopted open-source LMS that supports course management, content distribution, and assessments, but it lacks integrated modules for project supervision or fieldwork coordination [14]. The University of Dar es Salaam (UDSM) e-Learning Portal provides robust support for online course delivery and automated assessments, yet it remains focused on the teaching and learning cycle without formalized project supervision or defence logistics [2]. Makerere University MIS integrates student records, finance, and human resources at an enterprise level, but it is not tailored to faculty-specific pedagogical workflows such as ICT project management and fieldwork [3]. The Kenyatta University Portal advances project tracking capabilities but does not fully integrate fieldwork logbook monitoring or public-facing showcases [15]. Additionally, Ruaha Catholic University (RUCU) Student Information Management System (SIMS) provides core student and administrative record

management, yet it does not support comprehensive project lifecycle management, structured fieldwork coordination, or faculty showcases.

2.4 Research Gap

The review of related works reveals a persistent gap in higher education systems: existing platforms are either too general, focusing on course delivery or administrative records, or too fragmented, addressing only specific functions such as project tracking or student records. None of the reviewed systems, including Moodle, UDSM e-Learning Portal, Makerere MIS, Kenyatta University Portal, or RUCU SIMS, provides a holistic, integrated platform that unifies coursework, full project lifecycle management, fieldwork coordination, and public-facing showcases. This fragmentation compels institutions like RUCU's ICT Faculty to rely on multiple disconnected tools, leading to inefficiencies and inconsistent data management. The RUCU Integrated Learning Portal (RUCU-ILP) is therefore designed to bridge this gap by offering a unified, role-based system that addresses the pedagogical and administrative needs of ICT education.

Most existing systems are either too generalized, lacking domain-specific functionality, or too specialized, creating fragmentation across different academic processes. This forces institutions like the RUCU ICT Faculty to navigate a disjointed array of tools, compromising efficiency and coherence. The RUCU-ILP is conceived specifically to bridge this integration gap. It proposes a unified, role-based portal that synthesizes these disparate elements into a tailored ecosystem, designed to meet the unique pedagogical and administrative demands of ICT education.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the methodological approach adopted for the design, development, and implementation of the RUCU Integrated Learning Portal (RUCU-ILP). The methodology integrates software engineering principles with user-cantered design to ensure the system meets stakeholder requirements and academic standards. The chapter is structured to cover the project approach, research methods, area of the study, ethical considerations, study constraints, and the project budget.

3.2 Project Approach

The project follows the Agile Software Development Methodology, utilizing iterative cycles (Sprints) to facilitate continuous feedback, rapid adaptation, and incremental delivery. This methodology is particularly effective for university-based systems as it allows for regular refinements based on user feedback [16].

Figure 1 Showing Agile Development Methodology:

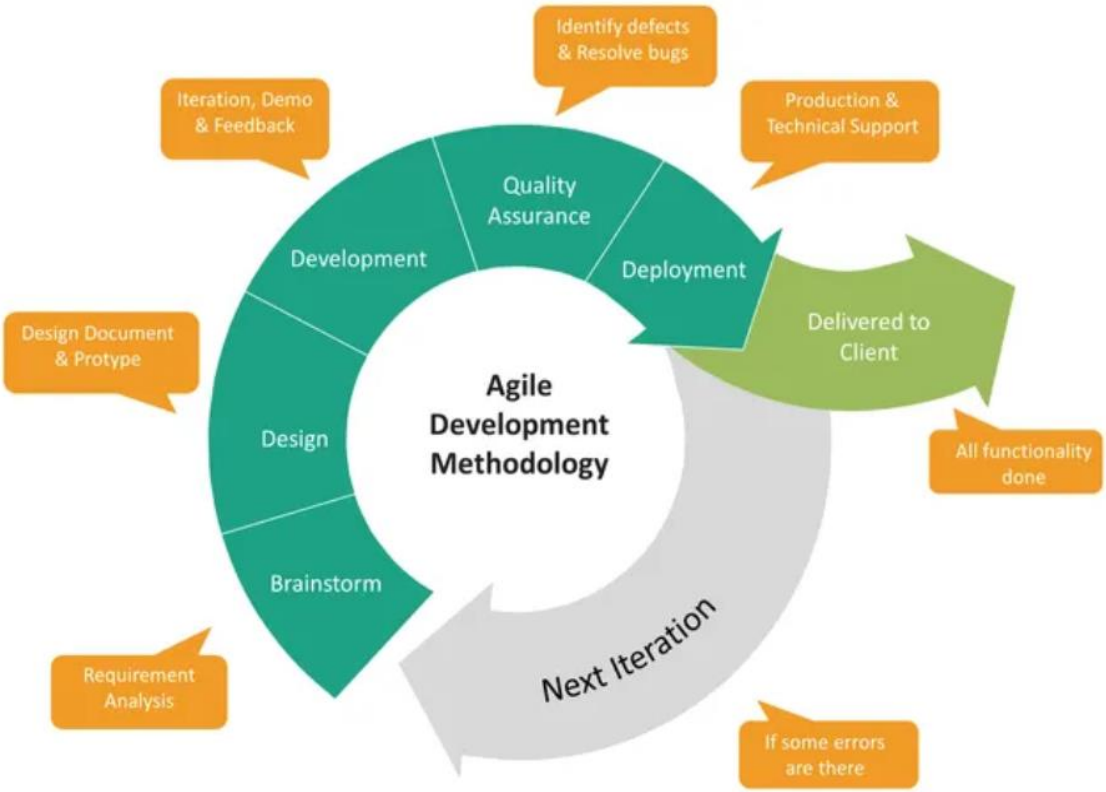


Table 1:Agile Software Development Methodology

Phase	Activities	Deliverables
Sprint 1: Planning	Requirement gathering, stakeholder workshops, and scope finalization.	Product backlog, project charter.
Sprint 2: Design	System architecture, database schema design, and UI/UX wireframes.	ERD, UI mockups, system prototypes.
Sprint 3: Development	Backend coding (PHP), frontend development (Bootstrap), and database integration.	Core modules, functional system components.
Sprint 4: Testing	Unit testing, integration testing, and User Acceptance Testing (UAT).	Test reports, bug fixes, UAT feedback.
Sprint 5: Deployment	Server configuration, data migration, and official go-live.	Live system, user manuals, training materials.
Sprint 6: Maintenance	Post-launch support, periodic system updates, and performance monitoring.	System logs, enhancement requests.

The selection of the Agile methodology for the development of the RUCU-ILP is justified by several key operational requirements. Iterative flexibility allows the development team to adjust features as requirements evolve during the 2026 academic year, offering adaptability that traditional Waterfall models cannot provide. Stakeholder engagement is enhanced by dividing the project into sprints, enabling faculty members and administrators to review functional prototypes early and ensuring that the final product aligns with actual user needs. Risk mitigation is achieved through the integration of testing into every phase of development, rather than postponing it until the end, which facilitates the early identification and resolution of technical issues. Finally, continuous delivery ensures that each sprint produces tangible outputs, maintaining steady progress toward the successful deployment of the system.

3.4 Data Collection Methods

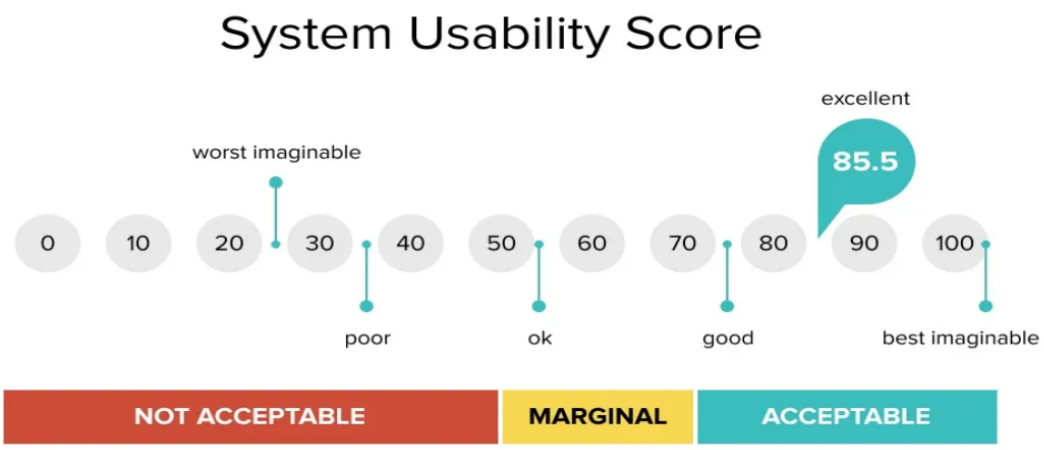
Data for the RUCU-ILP project will be collected using multiple methods to ensure a comprehensive understanding of user needs and system requirements. Survey questionnaires will be administered to 150 ICT students, 15 lecturers, and 2 administrators to gather

information on current system usage, challenges, and expectations. Semi-structured interviews will be conducted with key stakeholders, including the Head of Department, project coordinators, and IT staff, to obtain in-depth insights into administrative workflows, project supervision practices, and fieldwork coordination. Additionally, functional and non-functional requirements for the system will be identified through these surveys and interviews, capturing both the specific features the system must provide and the quality attributes such as performance, security, and usability necessary for effective operation. These combined methods will provide both quantitative and qualitative data to inform system design and development.

3.5 Performance Evaluation

The performance of RUCU-ILP will be assessed using usability and technical metrics to determine its effectiveness in supporting academic workflows. User satisfaction will be measured using the System Usability Scale (SUS), providing standardized scores from 0 to 100 and reflecting the perceived ease of use, usefulness, and overall acceptance of the system. Process efficiency will evaluate the time reduction achieved in completing key tasks, such as project submission, supervision, and fieldwork coordination, compared to the previous manual or semi-digital workflows. Error reduction will measure the decrease in inaccuracies, data entry mistakes, or lost records, indicating improved reliability and data integrity. Level of automation will assess the proportion of academic processes that are digitally managed versus manual, demonstrating the system's capacity to reduce administrative effort. These parameters, combined with system logs and monitoring tools such as Apache JMeter, will provide a comprehensive overview of RUCU-ILP's usability, performance, and impact on academic and administrative efficiency.

Figure 2:Showing System Usability Score



3.6 Data Analysis

Quantitative data will be analyzed using Microsoft Excel, employing descriptive statistics to summarize key trends and correlations to examine relationships between variables. Qualitative data from interviews and open-ended survey responses will be analyzed through thematic analysis, enabling the identification of recurring patterns, insights, and system requirements relevant to the RUCU-ILP project.

3.7 Area of the Study

The study will be conducted within the Faculty of Information and Communication Technology (ICT) at Ruaha Catholic University (RUCU), Iringa, Tanzania, which comprises approximately 1,000 students and 30 academic staff members. The study population will include registered ICT students from Year 1 to Year 3, lecturers involved in teaching, project supervision, or administrative duties, and ICT department administrative staff who are directly engaged in academic workflows. Participants excluded from the study are students and staff from other faculties, as well as external stakeholders who are not directly involved in the faculty's academic processes.

3.8 Ethical Considerations

The project adheres to RUCU's research ethics guidelines and international standards for system development involving human participants.

Table 2:4Ethical considerations and Guidelines

Ethical Aspect	**Implementation Measure**
Informed Consent	Participants sign consent forms explaining the study's purpose, risks, and benefits.
Confidentiality	Data anonymization, secure storage (encrypted database), and strict access control.
Data Privacy	Compliance with Tanzania's Personal Data Protection Act (2022) and GDPR principles.
Voluntary Participation	Participants may withdraw at any stage of the study or system testing without penalty.

Beneficence	System designed to benefit users without harm; security vulnerabilities addressed before deployment.

3.9 Study Constraints

Several constraints may impact the project timeline, scope, or quality:

Table 3:Study Constraints

Constraint Type	**Description**	**Mitigation Strategy**
Technical	Limited server infrastructure, intermittent power supply, and low internet bandwidth.	Use of XAMPP for local development; cloud backup; offline mode for critical functions.
Financial	Limited budget for advanced features (e.g., SMS integration, AI components).	Phased implementation; prioritization of open-source tools; seeking university grants.
Time	Academic calendar disruptions, semester breaks, and examination periods.	Agile sprints aligned with academic timelines; inclusion of buffer periods in the schedule.
Human Resource	Limited IT support staff for long-term maintenance and troubleshooting.	Comprehensive training of ICT students and staff; detailed documentation and knowledge transfer.
Stakeholder Availability	Busy schedules of faculty lecturers and university administrators.	Flexible interview schedules; use of online feedback forms for asynchronous communication.

3.9 Study Budget

The budget estimates cover development, deployment, training, and maintenance for one year.

Table: Detailed Budget Breakdown

Table 4: Showing Project Budget

Item No.	Description	Quantity	Unit Cost (TZS)	Total Cost (TZS)	Justification
1.	Software Licenses	1	Not measured	Not measured	Not measured
	Domain registration (1 year)	1	25,000	25,000	For public-facing faculty portal.
	SSL Certificate	1	50,000	50,000	Ensures secure data transmission.
	GitHub Pro (team)	1 year	120,000	120,000	Version control and collaborative development.
2.	Hardware & Hosting				
	Dedicated server hosting	12 months	10,000/month	120,000	Apache server with MySQL database.
	Backup storage (cloud)	12 months	15,000/month	180,000	Daily backups and disaster recovery.
3.	Development Tools				
	IDE (PHPStorm)	1 license	150,000	150,000	Professional development environment.

	UI/UX tools (Figma)	1 license	100,000	100,000	Interface design and prototyping.
4.	Personnel & Training				
	Training workshops	2 sessions	per/session	unknown	Training for staff and students on system use.
	GRAND TOTAL			**745,000**	

Chapter Summary

This chapter has detailed the methodology for developing RUCU-ILP, including the Agile approach, mixed-methods research design, ethical guidelines, constraints, and budget. The structured methodology ensures systematic development, stakeholder engagement, and adherence to academic and ethical standards.

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