ENGINEERING LICENSURE REVIEW SYSTEM FOR BULACAN AGRICULTURAL STATE COLLEGE

A Capstone Project

Submitted to the Faculty of the

Institute of Computer Studies

Bulacan Agricultural State College

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Information Technology

by

Bernardo, Vince Allen

Corpuz, Melvin

Dela Vega, Jaylyn

Perez, Jr Jeremiah Jason

Samaniego,Mark Joseph

Soco, Jr Alberto

Dr. Ma. Melanie A. Cruz

Adviser

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INTRODUCTION

Project Context

The Engineering Licensure Review System at Bulacan Agricultural State College has been conceptualized as a transformative educational tool to address the growing need for a more modern, accessible, and effective approach to licensure exam preparation among engineering students. Traditional review methods such as expensive physical review centers, printed handouts, and in-person sessions pose barriers in terms of accessibility, cost, and adaptability, especially for students from geographically distant or economically challenged backgrounds. These limitations often result in unequal preparation opportunities, reduced motivation, and increased anxiety among students, thereby affecting their chances of success in passing the engineering licensure examinations. Moreover, the traditional methods of review lack adaptability to the fast-paced changes in the engineering field and do not provide real-time feedback or performance tracking, which are essential for self-paced learning and continuous improvement.

As education around the world transitions toward digital solutions, students and instructors alike need platforms that match the speed, flexibility, and reliability of today's technology. The absence of a centralized, organized, and continuously updated system often leaves students feeling overwhelmed and underprepared, especially when they cannot access relevant and up-to-date study materials. This creates a disconnect between institutional support and the academic needs of future engineers, ultimately impacting the quality of graduates and their preparedness for real-world professional demands. To address these educational challenges, the Engineering Licensure Review System presents

a well-designed digital platform that serves as both a learning resource and a performance enhancement tool for graduating students, particularly those in Bachelor of Science in Agricultural and Biosystems Engineering (BSABEN) and Bachelor of Science in Geodetic Engineering(BSGE).

According to the Professional Regulation Commission (PRC) of the Philippines has reported fluctuating licensure examination results for BASC's engineering graduates in recent years. In the Bachelor of Science in Geodetic Engineering (BSGE) program, the passing rate was 66.67% in 2019, with 14 out of 21 examinees passing. This slightly improved in 2021, where 11 out of 16 candidates passed, resulting in a 68.75% rate. However, the performance declined in the following years—dropping to 47.83% in 2022 (11 out of 23 passers), then falling further to 21.43% in 2023 (6 out of 28 passers). A modest recovery was seen in 2024 with 26 out of 49 examinees passing, equating to a 53.06% success rate. For the Bachelor of Science in Agricultural and Biosystems Engineering (BSABEN) program, the passing rate stood at 52.38% in 2019 with 11 out of 21 successful examinees. In 2021, the rate decreased to 36.36% (4 out of 11 passers), followed by 44.44% in 2022 (8 out of 18), and further declined to 35.90% in 2024 (14 out of 39). These figures illustrate both the progress and challenges faced by BASC in enhancing the licensure performance of its engineering graduates.

Its core features include access to comprehensive and regularly updated review materials, lecture notes, and study guides, as well as an interactive practice exam module that mimics the actual licensure exam with randomized questions, time-limited testing, and instant feedback. Additionally, the system includes a content management system (CMS) for professors and administrators, allowing them to upload and maintain review content

that aligns with the latest PRC guidelines and industry developments. By integrating these features into one unified platform, the system promotes independent learning, supports collaboration between students and faculty, and empowers learners to focus on the areas that need improvement. In alignment with the United Nations Sustainable Development Goals (SDGs), this project supports SDG 4: Quality Education by ensuring inclusive and equitable access to high-quality learning resources through a digital, mobile-friendly platform, breaking down financial and geographic barriers that traditionally hinder exam preparation. It also contributes to SDG 9: Industry, Innovation, and Infrastructure by leveraging innovative technologies to build a sustainable educational infrastructure that is adaptive, efficient, and aligned with modern academic needs. Furthermore, the system supports SDG 10: Reduced Inequalities by leveling the playing field and providing equal opportunities for all students, regardless of their socioeconomic background or location.

By implementing this digital solution, Bulacan Agricultural State College stands to redefine how it supports the professional journey of its engineering students. This system not only streamlines the exam review process but also creates a tech-forward, student-centered learning environment where knowledge is up-to-date, resources are easily accessible, and learning is measurable. It promotes a culture of academic excellence and innovation while reinforcing the institution’s commitment to sustainability, educational equality, and national development. Through this initiative, BASC strengthens its role as a progressive academic institution that embraces modern solutions to long-standing challenges and contributes meaningfully to global education and development goals.

Purpose Description

The Engineering Licensure Review System for Bulacan Agricultural State College is an innovative web-based platform developed to assist engineering students in their preparation for licensure examinations. The primary goal of the system is to offer practice exam and study materials that will enable students to track their progress and focus on areas requiring improvements. The system will provide updated and comprehensive review materials, including lecture notes and study guides tailored to Agricultural and Biosystems Engineering and Geodetic Engineering students.

Additionally, the platform will feature an interactive practice exam system that simulates actual licensure exam. This will include randomized questions, time-limited assessments, and instant feedback to enhance exam readiness. To further support students and faculty, the system will integrate a Content Management System (CMS) that allows professors to update the materials regularly, ensuring alignment with the latest trends, technological advancements, and PRC examination requirements. The implementation of this digital review system is expected to improve accessibility and efficiency in licensure exam preparation, ultimately leading to better students' performance.

Objectives

The Engineering Licensure Review System at Bulacan Agricultural State College aims to streamline processes for both academic and organizational activities Bulacan Agricultural State College's Engineering Licensure Review System seeks to optimize procedures for organizational and academic endeavors. It supports engineering students

with updated licensure review procedures and improves proposal submission, review, and approval by integrating effective file management and real-time notifications. This cutting-edge technology encourages academic quality, effectivey, and accessibility.

General Objectives

The main objective of this system is focuses on Engineering Licensure Review System for Bulacan Agricultural State Collage is to offer practice exam and study materials to help students track progress and for improvement, thereby enhancing their exam preparation.

Specific Objectives

Specifically, the project aims to:

1. Develop a Content Management System (CMS) for LERP coordination, continuously updating it with the latest trends, technological advancements, and PRC examination updates.

2. Provide a digital platform that provides updated and comprehensive review materials, including lecture notes and study guides, for graduated and graduating engineering students like Agricultural and Biosystems Engineering and Geodetic Engineering.

3. Implement an interactive practice exam nation system that simulates the actual licensure exam, offering randomized questions, time-limited assessments/evaluations, and instant feedback to enhance exam readiness ; and

4. Determine the system's level of ENGINEERING SYSTEM using ISO 25010 in terms of:

    o functionality;

    o performance; and

    o usability.

Scope and Limitations

The goal of the project is to create the Engineering Licensure Review System, a complete online resource that offers current review materials for a range of geodetic subjects, such as mathematics, geodesy, cartography, laws, obligations, contracts, theory, and practice.

The system aims to provide a centralized digital platform that offers updated and comprehensive review materials specifically tailored for graduating engineering students, particularly those in Bachelor of Science in Agricultural and Biosystems Engineering (BSABEN) and Bachelor of Science in Geodetic Engineering(BSGE). This platform serves

as a reliable academic resource by granting students access to essential content such as lecture notes, study guides, and other review materials that are regularly maintained and aligned with the latest licensure examination coverage. By offering these materials in a digital format, the system ensures that students can conveniently and consistently review anytime and anywhere, promoting flexible, self-paced learning that caters to their individual preparation needs.

The system also implements an interactive practice exam module that closely simulates the actual engineering licensure examination. This feature is designed to enhance students' exam readiness by providing randomized questions, time-limited assessments, and immediate feedback upon completion. By mimicking the structure and pressure of the real exam environment, the system helps students develop effective time management skills, identify their strengths and areas for improvement, and build confidence in their test-taking abilities. The instant feedback mechanism allows learners to reflect on their performance in real-time, promoting continuous improvement and a deeper understanding of key concepts essential for passing the licensure examination.

The system integrates an interactive practice exam module that effectively simulates the actual engineering licensure examination. This feature is specifically designed to boost students’ exam preparedness by offering randomized sets of questions, time-constrained evaluations, and instant feedback upon completion. By replicating the structure and pressure of the real testing environment, it enables students to develop crucial time management skills, recognize their strengths and weaknesses, and build greater confidence in their test-taking abilities. The immediate feedback provided after each

attempt encourages learners to reflect on their performance, facilitating continuous self-assessment and reinforcing their understanding of key concepts necessary for licensure exam success.

To evaluate the engineering effectiveness of the system, the ISO 25010 software quality model can be applied, specifically focusing on functionality, performance, and usability. Functionality assesses whether the system meets the intended requirements by ensuring the accuracy, completeness, and reliability of its core features, such as access to updated review materials, simulation of practice exams, and content management for administrators. Performance efficiency evaluates the system's responsiveness and resource utilization, including how well it handles multiple users, the speed of content loading, and the smooth execution of time-limited assessments without delays or crashes. Usability measures how easily students and faculty can navigate and interact with the platform, which includes the clarity of its user interface, ease of learning, accessibility across devices, and the overall user experience. By assessing these three characteristics, the system's quality and effectiveness can be systematically validated, ensuring that it not only functions as intended but also delivers a high level of satisfaction and value to its users.

While the system offers a comprehensive and interactive platform for engineering graduates to prepare for their licensure exams, it has several limitations. Its reliance on stable internet connectivity may hinder access for users in areas with poor service. The platform focuses on theoretical knowledge and problem-solving, but cannot substitute for hands-on experience with engineering instruments. Content accuracy depends on timely updates aligned with PRC guidelines, and delays may affect exam readiness. Although

mobile-friendly, some features may perform better on larger screens like desktops or laptops. The effectiveness of gamified elements varies by user, as digital rewards may not fully motivate everyone. Technical issues such as bugs or server down-times may occur, requiring continuous maintenance. Furthermore, while the system provides automated feedback and discussion forums, it cannot fully replace personalized guidance from experienced mentors, emphasizing the importance of supplementary resources like practical training and coaching.

Definition of Terms

The following terms we defined operationally to clarify and enhance the under standing of the research study

- **Licensure Examination** – A standardized test that assesses the competency of engineering graduates before they can obtain a professional license.
- **Review System** – A digital platform that provides structured study materials and practice tests for students preparing for licensure exams.
- **Content Management System (CMS)** – For LERP coordinator to easily upload and update materials..
- **PRC (Professional Regulation Commission)** – The regulatory body in the Philippines that is responsible for overseeing professional licensure examinations and certifications.
- **Interactive Practice Exam** – A digital testing system that includes features such as randomized questions, time-limited assessments, and instant feedback.

- **ExamVeda** - a website that provides practice exams,quizzes, and study materials help student prepare for different subject and competitive exams.
- **IndiaBix** - An online learning platform that offers questions,answers and explanation on various topic to help user prepare for exam and skill tests.
- **Visual Studio code** - It is an open source code editor used by developers to create the system.
- **HTML (HyperText Markup Language)** - The standard language used to create the structure and content of web pages.
- **CSS(Cascading style sheets)** - a language used to style and design the appearance of web pages,such as colors,fonts,and layout.
- **Bootstrap** - a free and open sources framework that helps design responsive and mobile friendly websites easily using ready made templates and components.
- Front-end - The part of website that user see and interact with,which includes design,layout,and visual made using HTML and CSS.
- **PHP** - a server side scripting language used to create dynamic web pages and connect websites to databases.
- **Back-End** - the part of a website that handles data,logic,and server operations often languages like PHP.
- **MySQL database** - a system used to store, organize, manage data for websites used together with php.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter discusses various studies and literature about the use of technology in education, focusing on how it helps students prepare for licensure examinations. In recent years, digital tools have greatly improved traditional review methods, making studying more accessible, convenient, and engaging.

The study is based on the capstone project titled “Engineering Licensure Review System for Bulacan Agricultural State College.” This project aims to develop a web-based platform that supports engineering students in reviewing for their board exams. It provides practice tests and study materials to help students assess their progress and focus on the areas that need improvement.

In the past, students relied on traditional review methods such as printed handouts, face-to-face tutorials, and review centers. However, these approaches can be costly and time-consuming. With the help of digital review systems, students now have a more flexible and interactive way to study at their own pace—making review sessions more effective and accessible anytime and anywhere.

FOREIGN

Online learning platforms can greatly improve access to study materials and help students learn better, even if they have different learning needs based on gender or field of study. This study guided the design of our Engineering Licensure Review System for

Bulacan Agricultural State College by showing the importance of creating a platform that is simple, easy to use, and supports students with different backgrounds. It emphasized the need for clear navigation, well-organized materials, and interactive tools so that all students can use the system effectively and benefit equally. By applying these ideas, our system ensures that students can study smoothly and have a better learning experience.. (Alshahrani et al., 2022)

Web-based education does not negatively affect students' attitudes toward computers and the internet. Students can confidently use digital learning tools without feeling stressed or overwhelmed. This supports the inclusion of web-based tools in our Engineering Licensure Review System, allowing students to comfortably interact with online lessons and quizzes. It ensures that students can focus on learning without being afraid of using technology.(Al-Harbi, 2015)

E-learning promotes sustainability in higher education by reducing the need for printed materials and improving the management of study resources. Inspired by this, our system stores review materials digitally and uses a well-organized content management system. This makes it easier for students to access lessons anytime and for administrators to maintain the materials. It also reduces reliance on physical resources while making learning more convenient.. (Bawa, 2020)

AI-enabled adaptive learning systems can adjust content based on each student's needs, helping students focus on areas where they need improvement. Following this idea, our Engineering Licensure Review System includes adaptive features such as practice quizzes, instant feedback, and recommendations on which topics to review more. This

helps students study in a personalized way and improves their readiness for the licensure exam.(Chen et al., 2017)

Mobile learning allows students to study anytime and anywhere using phones, tablets, or laptops. Our system is mobile-friendly, so students can access lessons, quizzes, and resources wherever they are, without being limited to a computer. This flexibility helps students manage their study time efficiently and continue learning even when they are away from school or home.(Gikas & Grant, 2017; Lai & Hwang, 2019)

Gamification, which includes quizzes, points, rewards, and progress tracking, can improve engagement and learning outcomes. Inspired by this, our system includes interactive quizzes, performance tracking, and rewards, making learning more fun and motivating. Students are encouraged to keep practicing and can clearly see their improvement over time.(Srivastava et al., 2019)

LOCAL

Distance learning review programs in the Philippines received positive feedback from students, showing that online review programs can be effective. This inspired our Engineering Licensure Review System For bulacan agricultural state college to include online quizzes and study resources specifically for engineering students. Students can practice at home and improve their understanding of exam topics without needing to attend physical review centers.(Aaron Bryan Lopez, 2019)

Structured online learning improves knowledge outcomes, as shown in e-learning programs for medical interns. Our system uses structured modules with lessons, quizzes,

and progress tracking. This organization helps students focus on specific topics, monitor their performance, and improve steadily in preparation for the licensure exam. (Alinea, 2019)

Learning management systems for engineering students, like E-Math Version 2.0, track student progress and manage profiles. Our system also tracks student performance, allowing personalized feedback and ensuring that students know which topics need more attention. This feature helps students study more efficiently and stay on track. (Angeles, 2015)

Studies on computer-aided design (CAD) in engineering education highlight the importance of modern technologies in learning. Similarly, our system uses up-to-date digital tools and interactive resources to keep students engaged, making learning more interesting and relevant to current engineering practices. (Manrique, 2024)

The sudden shift to online learning during COVID-19 highlighted the need for stable, accessible, and user-friendly online systems. Our Engineering Licensure Review System is designed to be reliable, easy to navigate, and accessible to all students. This ensures a smooth learning experience, allowing students to focus on preparing for their licensure exam without technical difficulties. (Irie, 2021; Arinto, 2019)

Synthesis

The reviewed foreign and local studies both gave important ideas that helped in creating our Engineering Licensure Review System for Bulacan Agricultural State College. The foreign studies showed that online learning platforms can really make studying more flexible and easier to access. They also proved that students can learn better when the system is simple, organized, and interactive. Features like mobile learning, quizzes, and progress tracking make studying more enjoyable and effective. Because of these findings, our system was designed to be easy to use, accessible anytime, and helpful for students with different learning styles.Local studies also supported the idea that online review programs and e-learning systems are effective for Filipino students. They showed that having structured lessons, feedback, and tracking tools can help students improve and stay motivated. These studies guided us to include organized modules, performance tracking, and digital tools in our review system. The experiences during the COVID-19 pandemic also reminded us that online platforms should be stable and user-friendly, especially for students who rely on technology for their studies.In short, both foreign and local studies became a strong foundation for building our Engineering Licensure Review System.for bulacan agricultural stat college By applying what these studies discovered, our system aims to provide engineering students with a modern, engaging, and convenient way to prepare for their licensure exams.

CHAPTER III

METHODOLOGY

Environment

This capstone project was carried out within the academic environment of Bulacan Agricultural State College (BASC), primarily focusing on the Institute of engineering departments. The initiative supports the development of an Engineering Licensure Review System tailored for graduating students of the Bachelor of Science in Agricultural and Biosystems Engineering (BSABEN) and Bachelor of Science in Geodetic Engineering (BSGE) programs. This system aims to provide structured, interactive, and accessible review tools through a centralized digital platform.

Situated in San Ildefonso, Bulacan, BASC is a public institution known for academic excellence in agriculture and engineering. The growing demand for self-paced and flexible review resources has highlighted the need for a more modernized approach to exam preparation. Traditional methods, including printed handouts and irregularly updated review content, often prove inefficient and inconsistent. As a response, this project delivers an alternative digital system that promotes continuous learning, up-to-date content, and a simulated licensure exam experience. The system also allows educators to monitor students' progress while maintaining alignment with the standards set by the Professional Regulation Commission (PRC).

Requirements Specification.

The developers interviewed their clients, Engr. John Victor Acuña and Engr. Shiela Marie F. Gatchalian, from BASC - College of Engineering and Technology.

This system is developed to assist engineering students at BASC in preparing for their licensure examinations. The concept is inspired by an existing website called EXAMVEDA, IndiaBIX which offers resources related to engineering.

The client requested that the system have a unique. Specifically, they want the homepage to feature an admin dashboard that displays the number of students in the Department of Geodetic Engineering and the Department of Agricultural and Biosystems Engineering. They also want clear statistics highlighting which subjects require more attention and which ones have the highest failure rates. Rather than manually reviewing exams, they prefer the system to automatically check and grade the mock exams taken by students. Furthermore, they requested the inclusion of the subject scopes.

The system will include a content management system (CMS) for LERP coordinators and instructors to easily upload and update materials, a notification panel for exam announcements and updates, time-restricted test modules with automatic scoring, randomized mock exams that replicate real PRC exam settings, organized access to subject-based review materials, and secure login functionality for both students and administrators.

Operational Feasibility

The Engineering Licensure Review System, created by students from the Institute of Computer Studies at Bulacan Agricultural State College (BASC), is designed to help BASC engineering students prepare for their board exams. The system has two main users:

admins and students.

Admins can log in to a dashboard where they can upload reviewer materials, create and manage questionnaires, approve or reject student sign-ups, and add or delete subjects. They can also view student scores to see which subjects need more attention.Students must sign up for an account, and once approved by an admin, they can log in to the system.

Approved students can view and download review materials, take exam, and see their scores right after submitting. If a student closes the exam before finishing, their progress will be lost, and they will get a new set of random questions when they return.The system works online, so students can access it anytime and anywhere with an internet connection. Before it is officially used, the system is tested to make sure everything works well and to fix any errors. This system makes it easier for students to study and for admins to manage review materials and track student performance.

Technical Feasibility

To ensure the successful implementation of Engineering Licensure Review System at Bulacan Agricultural State College, several technical consideration must be examined. This includes identifying the necessary of software requirements, such as servers and computer devices, for the development, deployment, and testing. The system should operate efficiently across various devices and web browsers, with a focus on desktop accessibility. The development team emphasizes cross-platform compatibility and a responsive web design. Moreover, secure data transmission and any required adjustments for compatibility are also considered. Overall, the system is technically achievable using the tools and platforms currently available to the development team.

Schedule Feasibility

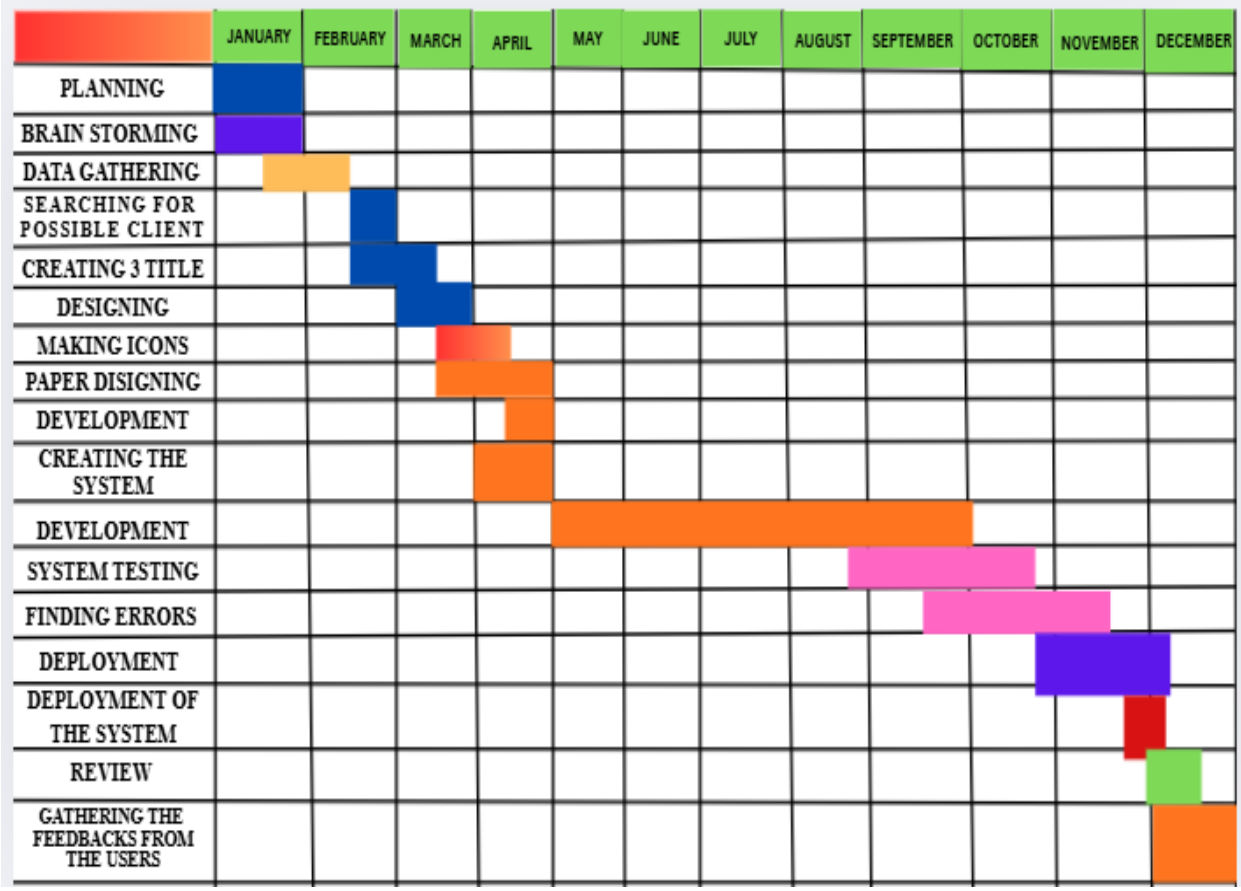

Table .1Gantt Chart

The project started with planning and brainstorming in January. In February and March, the team gathered data, searched for a client, created titles, designed the system, made icons, and prepared paper designs. Development of the system began in late March and continued until June.System testing was done from July to September, while errors were fixed from August to October. The system was deployed in October, reviewed in November, and feedback from users was collected in December.The timeline shows that the project was carefully planned, developed, tested, and improved before it was launched.Agile methodology will guide this schedule, ensuring flexibility and adaptability to feedback and changes throughout the development lifecycle.

Economic Feasibility

Cost-Benefits Analysis

Cost Category	Initial-Cost
Hosting	₱1000
Domain	₱600
Total Cost =	**₱1,600**

Table.2 Requirements Cost

Tangible Benefits	Estimated Annual Value (₱)
Bond paper	₱2200
ink	₱1800
Total Benefits =	**₱3,100**

Table.3 Tangible Benefits

Formula	Result
ROI (%)=Total CostsTotal Benefits−Total Costs ×100	93.73%

	Year 1	Year 2	Year 3	Year 4	Year 5
cost	₱1,600	0	0	0	0
benifits	3100	3100	3100	3100	3100
Net benefits	1500	3100	3100	3100	3100
Cumulative Benefits	3100	6200	9300	12400	15500
ROI(%)	93.75	287.50	485.25	675.00	868.75

Table.4 Return of Investment (ROI) Benefits Formula

Table 4 shows the Return on Investment (ROI) of the project over five years. In Year 1, the project cost ₱1,600 and earned ₱3,100, giving a net benefit of ₱1,500 and an ROI of 93.75%. From Year 2 to Year 5, there were no additional costs, but the project continued to generate ₱3,100 each year. This made cumulative benefits rise to ₱15,500 by Year 5, with the ROI increasing steadily to 868.75%, showing that the project provides growing financial returns over time.

Conceptual Framework

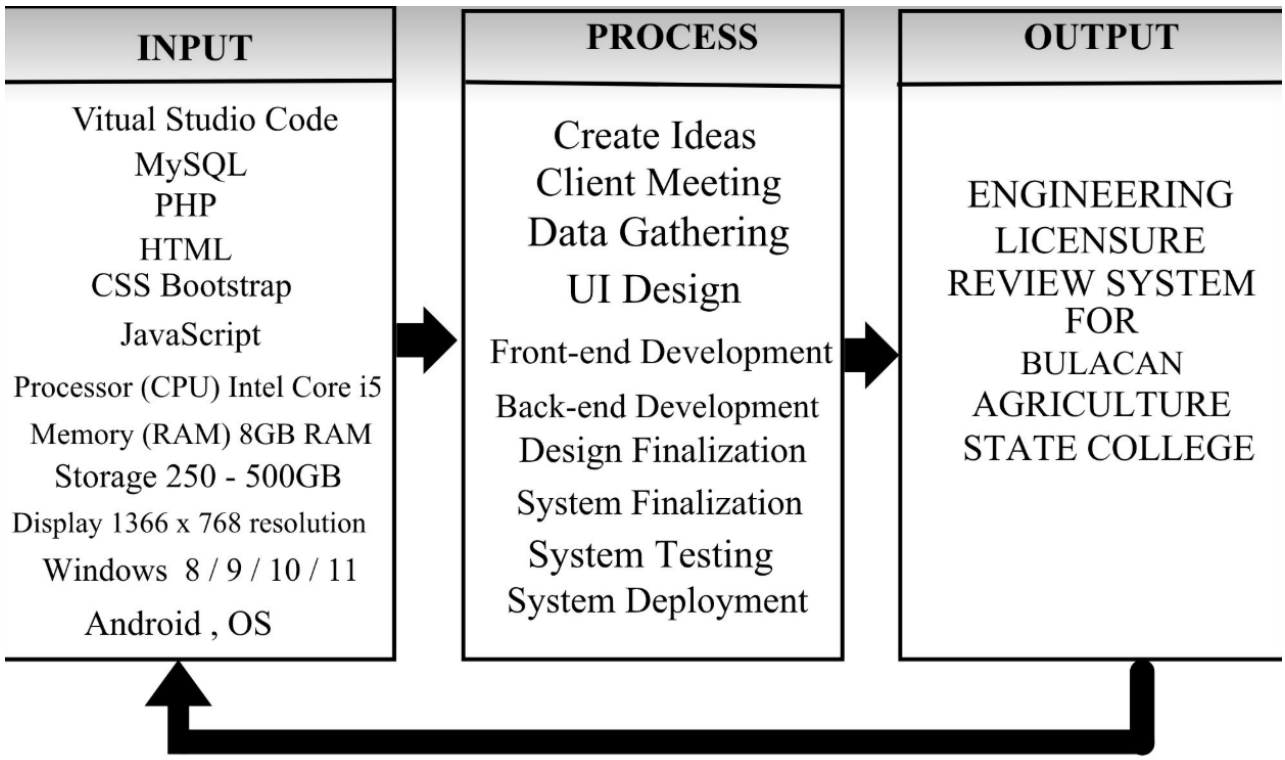

Figure 2: Conceptual of the study

The conceptual framework of the Engineering Licensure Review System for Bulacan Agricultural State College is structured using the Input-Process-Output (IPO) model. This model demonstrates how essential tools and steps are used to develop a functional and responsive web-based system that supports both academic review and administrative tasks.

The input phase consists of software and hardware resources. Software tools include Visual Studio Code for editing code, PHP for building dynamic web pages, MySQL for managing data, HTML for page structure, CSS and Bootstrap for design and

layout, and JavaScript for interactive features. The hardware requirements include at least an Intel Core i5 processor, 8GB RAM, 250–500GB of storage, and a display with 1366×768 resolution. The system is compatible with Windows (8 to 11), Android, and iOS.

In the process phase, the system goes through several stages: generating ideas, client meetings, gathering data, designing the user interface, developing both the front-end and back-end, finalizing the design, testing the system, and finally deploying it. Each step ensures that the system is built effectively and functions reliably.

The output phase is the final system itself—a complete Engineering Licensure Review System. It allows administrators to manage review materials, upload and edit sets of questions, track student performance, and store all data securely. This system improves the way students prepare for exams and helps administrators organize academic content more efficiently.

Development Method

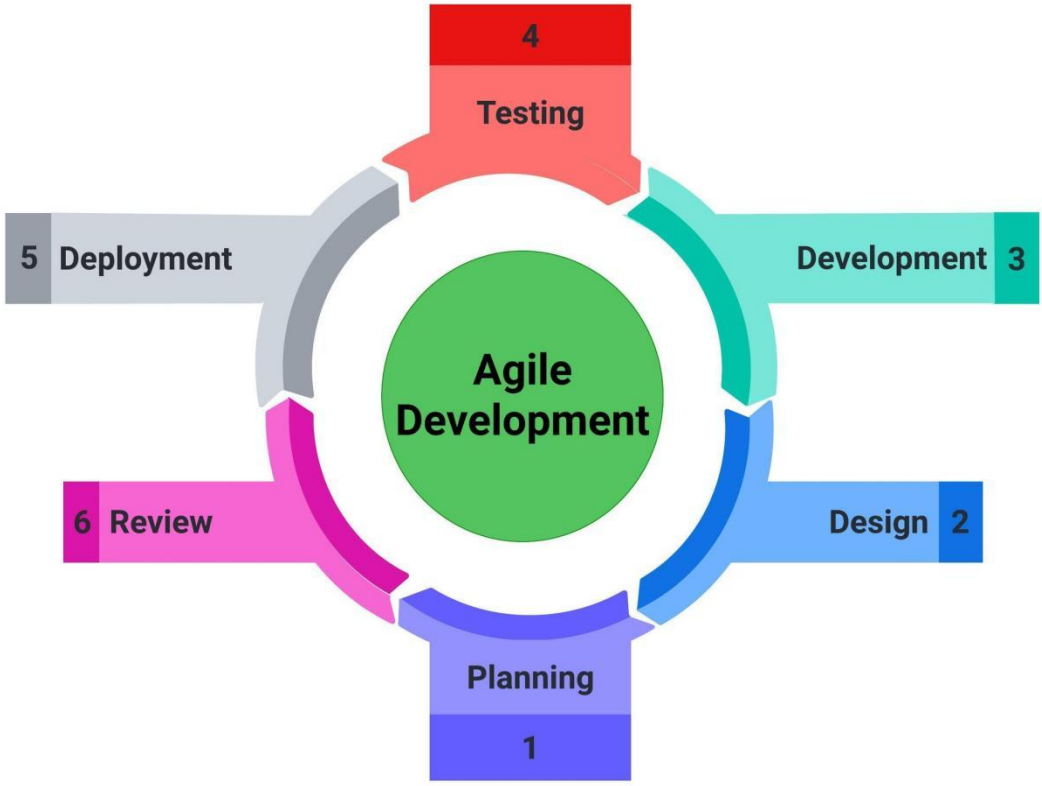

Figure 3. Development Method

Figure 3 outline the development method of the Engineering Licensure Review System was guided by the Agile Software Development Methodology, which emphasizes collaboration, adaptability, and iterative progress. Agile was chosen for this project because it allows the development team to deliver working features incrementally, adapt to changing requirements, and incorporate feedback from stakeholders regularly.

Unlike traditional linear methods, Agile promotes short development cycles called sprints, where progress is evaluated continuously. After each sprint, feedback from faculty and student testers is used to revise or improve upcoming features, ensuring that the system evolves based on actual user needs.

Planning

The student developers from the Institute of Computer Studies (BASC) met with the client at the Institute of Engineering and Applied Technology (BASC) to discuss ideas. After gathering the required data, the developers conducted an analysis to talk about, evaluate, and determine the next plan of action. This method enabled the developers to comprehend the project's specifications and create a system that fulfills the client's plan.

Design

The layout selected during the planning phase was used by the developers to create the user interface, ensuring that the website was responsive. The design of the buttons, labels, headers, and sidebars is consistent in style.

Development

During the development process, the developers used tools such as VS Code for coding, HTML, CSS, and Bootstrap for the front end, PHP for the back end, and MySQL for the database.

Testing

A key component of the testing procedure was making that the system worked as intended and satisfied the client's needs. To find and fix such problems early in the development process, testers objectively assessed the system's features, functionality, performance, and scalability. Building a solid and dependable system required extensive testing, which gave users assurance that the deployed system would function as planned.

Deployment

Before being deployed, the finished system was tested at the Institute of Engineering and Technology to make sure there were no errors or bugs.

Review

The review process for the system's functionality, performance, and usability was shared with the LERP coordinator, students, panelists, advisers, and others to quickly find and fix any issues, helping keep the system reliable and effective.

Design of Software, Systems, and Process

This section explains the design of the Engineering Licensure Review System for Bulacan Agricultural State College. The system was created based on the needs of both the students and the admin. It aims to make the review process easier, more organized, and more helpful for engineering students preparing for their licensure examination.

The system was developed step by step to make sure that all parts work properly. Feedback from users was used to make improvements and make the system easy to use. Students can review lessons, take mock exam, and check their scores, while admins can upload reviewers, create questionnaires, and manage users.

Entity-Relationship Diagram

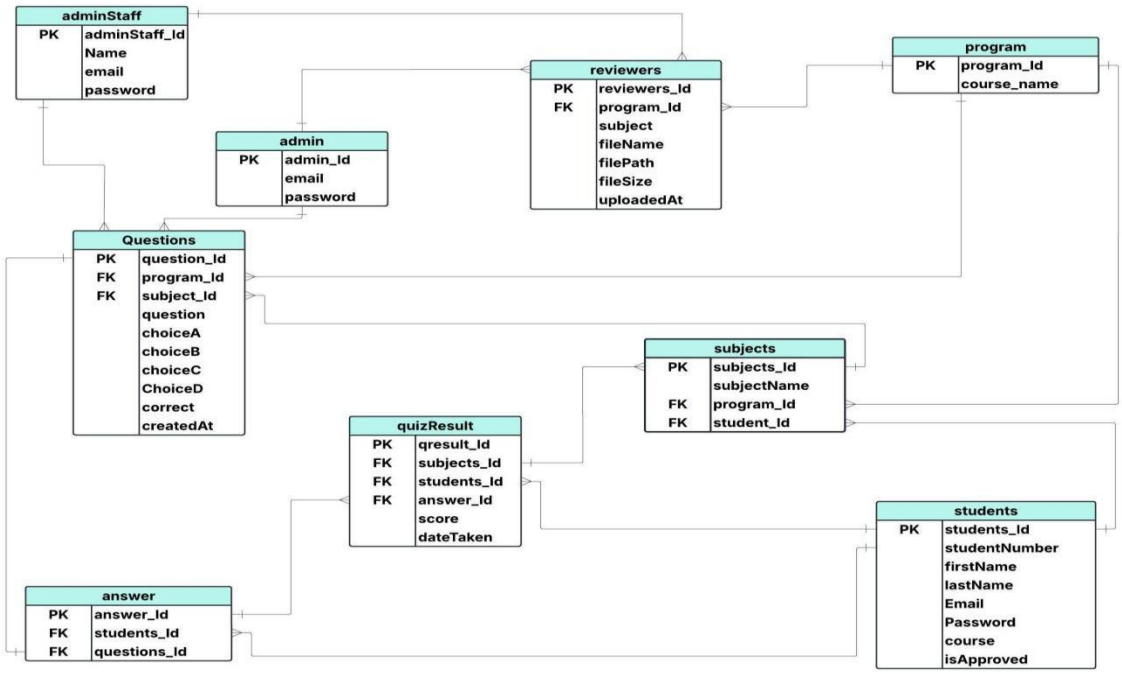

Figure 4. ERD

Figure 4 show Entity Relations Diagram This database is used to store and manage all the information in the licensure review system. Admins and admin staff use it to add or manage reviewers, questions, and student data. Students use it by logging into the system and accessing reviewers, answering questions, and getting their quiz results—all of which are saved here. Each student is linked to a program and subject, allowing personalized review materials and quizzes. When a student answers a quiz, their responses are stored in the `answer` table, and their scores are recorded in the `quizResult` table. Admins use the database to track student performance, update content, and manage approvals. The system connects all users and activities through these tables, ensuring that everything—from login to scoring—is organized and accessible. It allows for seamless interaction between students

and admins while keeping data secure, updated, and easy to retrieve when needed for reports or evaluations.

Context Diagram

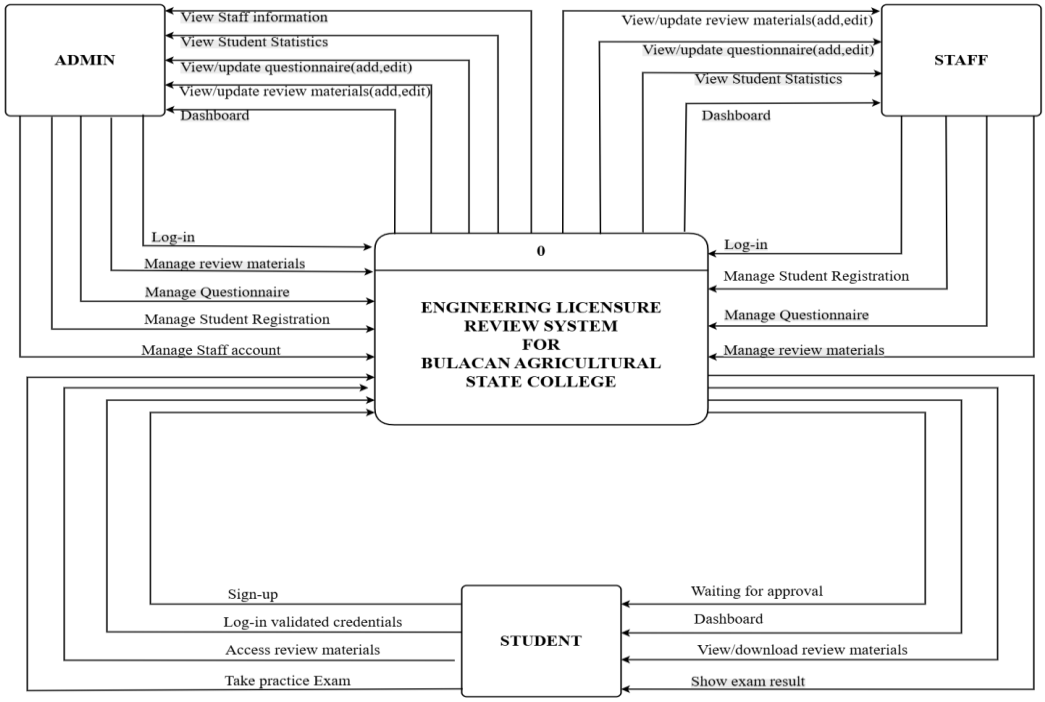

Figure 5. Context Diagram

Figure 5 shows the Context Diagram of the Engineering Licensure Review System for Bulacan Agricultural State College. It illustrates how the system interacts with the three main users: the admin, staff, and students. The admin can log in to manage staff accounts, student registrations, review materials, and questionnaires. The staff can also log in to update questionnaires, upload review materials, and view student statistics. Meanwhile, students can sign up, log in, download review materials, take practice exams, and view

their exam results. Overall, the diagram shows how information flows between users and the system, making it easier to understand each role and function within the system.

Data Flow Diagram

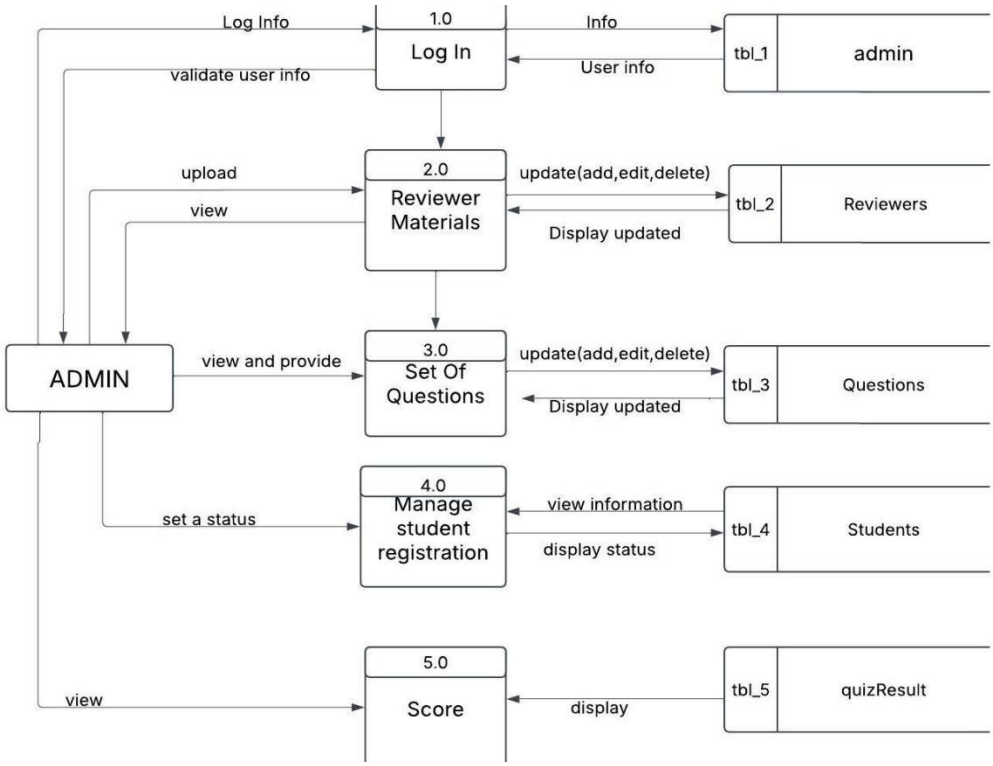

Figure 6. Data Flow Diagram (Admin)

Figure 6 shows the Data Flow Diagram (DFD) Level 1 of the Engineering Licensure Review System for Bulacan Agricultural State College. It explains how the system processes data and interacts with the admin and different system tables. The process starts when the admin logs in, and the system validates the user information. After logging in, the admin can upload and view reviewer materials, manage sets of questions, and handle student registrations. Each process updates the related tables such as reviewers, questions, students, and quiz results. The admin can also view the scores of students to monitor their

performance. This diagram shows how data moves between the admin and the system, ensuring organized management of information and smooth operation of the system.

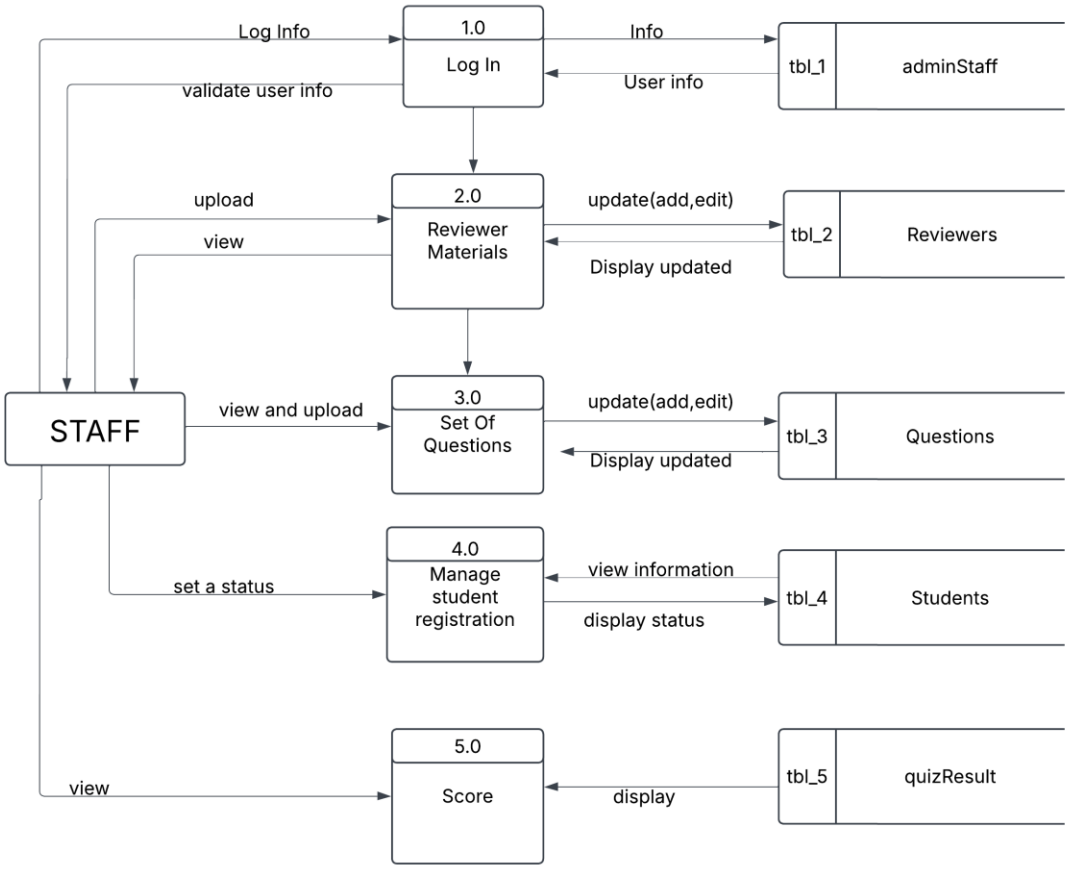

Figure 7. Data Flow Diagram (Staff)

Figure 7 illustrates the overall flow and functionality of the admin system. It shows how admin staff can log in and access different modules for managing educational materials and student data. Once logged in, the admin can use the Reviewer Materials module to upload or view study files, which are saved in the reviewers' database. The Set of Questions module lets them add, edit, or view questions, with changes stored in the questions database. The Manage Student Registration module allows the admin to check student details and update their registration status, which is recorded in the students'

database. In the Score module, quiz results are displayed, which are retrieved from the quizResult database. Each module is directly linked to a specific database, ensuring accurate and secure data handling. This setup helps the admin manage academic content and student information more efficiently and keeps the system organized and reliable.

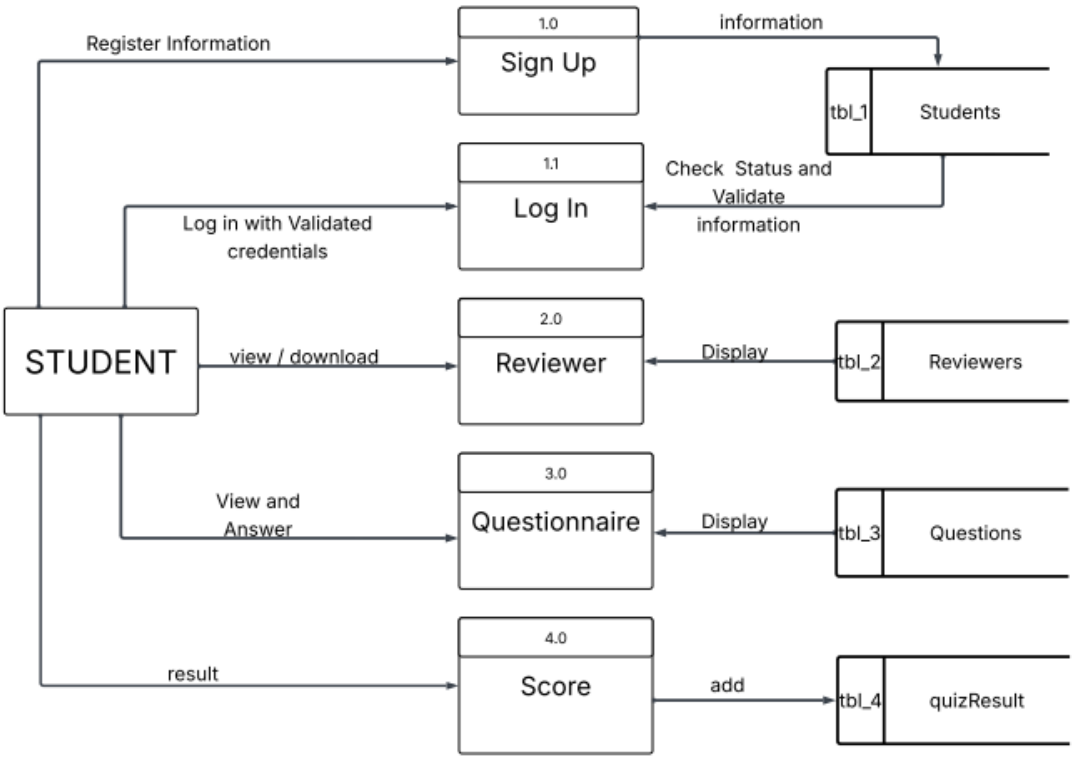

Figure 8. Data Flow Diagram (Student)

Figure 8 show data flow diagram(DFD) For engineering students, students to review and practice for the licensure exam. First, the student registers through the “Sign Up” module by entering their personal information. Once registered, they can log in using validated credentials. After logging in, they can access the “Reviewer” section, where they

can view or download study materials. The student can also go to the “Questionnaire” section to answer practice questions. After completing the quiz, the system will display their score, which is also saved in the database for future reference. All information—such as student data, reviewers, questions, and quiz results—is stored and retrieved from the database. This allows the student to use the system as a complete review platform where they can study, practice, and track their progress. The process is simple and user-friendly, making it easier and more effective for students to prepare for their licensure examination.

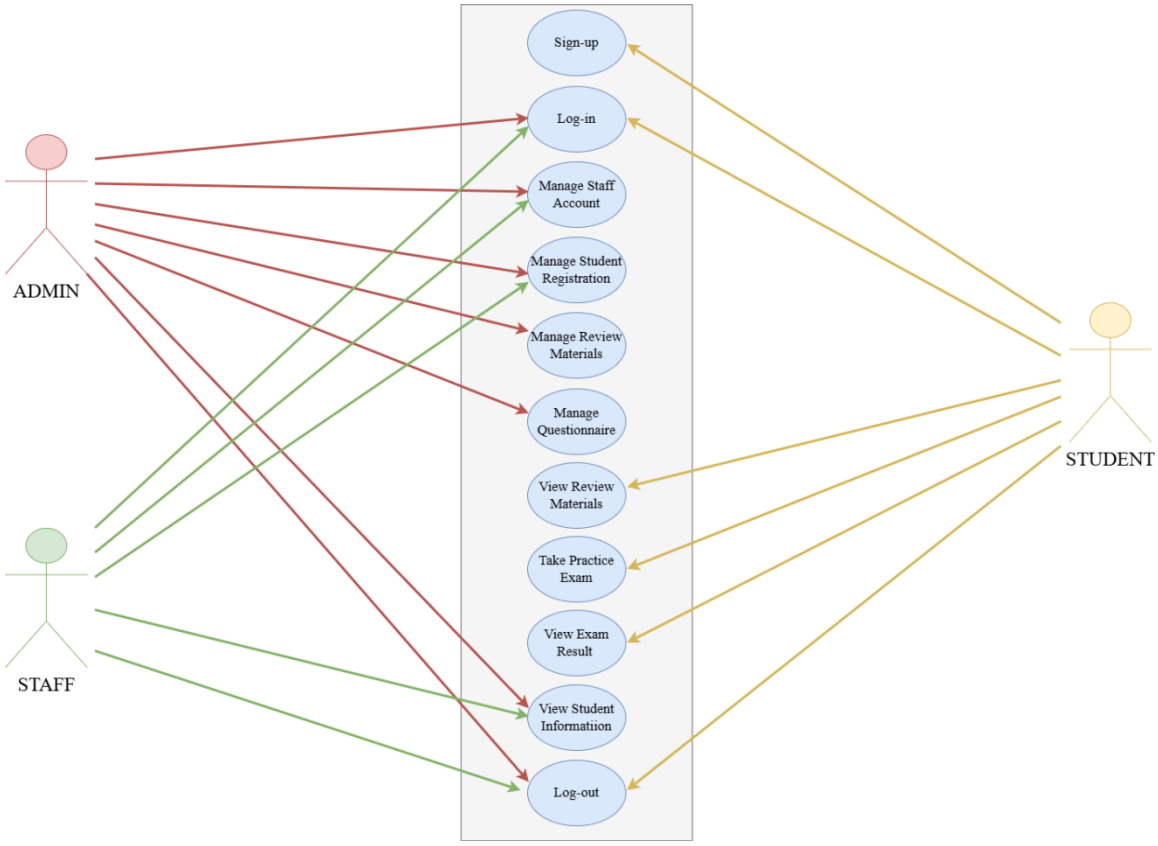

Figure 9. Use Case Diagram

Figure 9 shows how the different users interact with the *Engineering Licensure Review System*. The system has three main users — the Admin, Staff, and Student. Each of them has their own roles and responsibilities inside the system.

The Admin is in charge of the whole system. They can manage staff accounts, approve student registrations, upload and organize review materials, and create or edit the questionnaires for the exams. The admin can also view the information and performance of students, as well as log in and log out securely.

The Staff helps the admin in managing the system. They can do tasks such as logging in and out, managing student registrations, uploading review materials, handling

questionnaires, and viewing student details. Basically, the staff assists in keeping the system updated and organized.

The Student is the main user of the system. They can sign up for an account, log in, and log out. Students can view and study the review materials provided, take practice exams, and check their exam results afterward. This helps them prepare better for their licensure exams.

In the diagram, each oval represents a specific function or activity in the system. The lines connecting the users to these functions show which actions they are allowed to do. The red lines are for the admin, the green lines are for the staff, and the yellow lines are for the students.

Overall, Figure 9 explains how each user works together within the system. It shows the flow of activities between the admin, staff, and students, making the review process easier, more organized, and more accessible for everyone.

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Development

Software Specification

Software Tool	Purpose
Visual Studio Code	Write and edit code
PHP	Create dynamic web pages
MySQL	Store and manage website data
HTML	Structure of web pages
CSS	Style and design web pages
JavaScript	Interactivity to web pages
Bootstrap	Create responsive and modern web designs

Table 4. software requirement

The system was developed using several essential software tools. Visual Studio Code was used to write and edit the project's code efficiently. PHP handled the server-side logic to create dynamic web pages. MySQL was used to store and manage important data like user information and content. HTML provided the structure of the web pages, while CSS added styling and layout to make the pages visually appealing. JavaScript was used to make the pages interactive, allowing real-time responses and user actions. Finally, Bootstrap helped build a clean, modern, and responsive design quickly, making the website look good on all devices.

Hardware Specification

Table 5. Hardware requirements

Component	Minimum requirements
Processor (CPU)	Intel Core i5
Memory(RAM)	8GB RAM
Storage	500GB available disk space
Display	1366x768 resolution or higher
Network	Stable, high-speed internet
Device types	Desktop, laptop, tablet, smartphone

Table 5. Hardware requirements

The table shows the minimum hardware needed to run and develop the system properly. A computer with an Intel Core i5 processor is recommended to keep everything running smoothly. At least 8GB of RAM is needed to handle multiple tasks at once without slowing down. You should have 500GB of free storage to save the operating system, tools, and project files. A screen resolution of 1366x768 or higher helps you view and design pages clearly. A stable, fast internet connection is important for downloading resources, using online tools, and uploading the system to a web server. The system is also designed to work well on different devices like desktops, laptops, tablets, and smartphones.

Program Specification

The Engineering Licensure Review System represent interconnected responsive web for any gadget design to assist engineering student in their taking a licensure examination. Studentscan sign up waiting for approval of admin once a approve the student can log in can access the questionaire can answer and read or download a reviewer materials of their subject. And Admins can upload Reviewer materials and questionnaire can edit and delete and view the Results and can see the statistic of the student .

Programming Environment

Front End

For the front end of our system we use HTML, CSS, PHP and Bootstrap to make the system work behind the scenes. PHP handled the server side processing. CSS is for the style of our system to make it good and presentable and Bootstrap made the layout responsive so it works well on a variety of devices. This front end design allow users to easily execute actions such as uploading the review for the students, see the result grade of students on the activity and know what the subject their most focus on.

Back End

For the back end of our system same as on front end we use again HTML, CSS, PHP, Bootstrap and MySQL to store data. For the purpose of HTML in our system is to define the structure and content of web pages and also to create elements, like headings, forms etc. next is CSS is for the style, fonts, colors, and responsiveness. The third is PHP is for the processes forms, interacts with databases. The last is Bootstrap, is to simplifies

the design framework to improve also the image of our system.

Testing and Evaluation

The developers tested the website system responsiveness with the primary goal of identifying and fixing any problems. A thorough evaluation of the functionality was guaranteed by this procedure. We go into detail about the testing and evaluation procedures and standards in this section.

Unit testing

To guarantee the quality and reliability of the Engineering Licensure Review System, the smallest testable components, or units, were examined individually to verify their correct functionality. Unit testing was performed to reduce the chance of errors and defects in the system, thus improving its overall performance and user experience. This process also helped detect and fix issues early, especially when integrating different modules such as the Content Management System (CMS), study material retrieval, and the interactive practice exam feature. The evaluation included tests to confirm proper content updates, accurate access to review materials, randomized and timed exam questions. Specific examples of unit tests performed include:

1. Testing the CMS module to verify that new content, such as exam updates and announcements, could be added and retrieved successfully.

2. Validating that study materials for programs like Agricultural and Biosystems Engineering and Geodetic Engineering were accurately fetched and displayed to users.
3. Ensuring the practice exam module delivered randomized questions each time, provided a countdown timer for timed assessments, and offered instant feedback on answers.
4. Measuring system quality metrics aligned with ISO 25010, such as verifying functionality through correct operation of core features, evaluating performance by assessing page load times, and confirming usability by gauging user satisfaction scores

Integration Testing

ensures the interactions of several modules, including:

• Compatibility Testing

The developers conducted the following procedures to test the compatibility of the website:

1. Tested if the system is accessible and properly rendered on tablets and different screen sizes.
2. Tested and ensured accessibility tools like (screen readers) can interact with system elements.
3. Tested if verified multilingual content rendering across platforms.
4. Tested if the system works smoothly across different operating system like Windows, mac-OS, Linux, Android and iOS.
5. Tested if the system functions correctly on older and newer versions of browsers like Chrome, Firefox, Safari, Edge and Opera.

• Performance Testing

To testing the performance of the system, the procedure by the developers and

tester are:

1. Tested if the function of the website is working.
2. Tested if the performance of the system is working.
3. Tested the system's stability by submitting multiple activity.
4. Tested the database's ability to handle simultaneous queries from different users.
5. Tested monitored system logs for errors or crashes during stress testing.
6. Tested the system behaviour under limited bandwidth conditions.
7. Verified if caching mechanisms reduce repeated load times.

Stress Testing

To evaluate the system's behavior under extreme or unexpected conditions, such as excessive simultaneous user logins or bulk file uploads. This identified the system's breaking point and how it managed error handling or resource limitations, ensuring resilience and robustness during peak usage.

Load Testing

To measure how the system handles expected user traffic and transaction volumes over time. This involved simulating concurrent users accessing various features, such as downloading review files or taking exams, to ensure the system maintained stable performance without degradation.

System Testing

Overall, system testing validated that the platform was stable, user-friendly, and fully

ready for deployment

ISO 25010: A Comprehensive Guidance to Software Quality(ISO/IEC 25010:2011)

The Engineering Licensure Review System was evaluated using the ISO 25010 quality model, a globally recognized standard for assessing software quality. The system was assessed based on key quality characteristics, including:

Functionality

The system was assessed for its ability to perform its intended operations accurately and reliably. This included verifying the suitability of core features such as content management, review material access, and practice exam functionality. Accuracy was tested by comparing system outputs with expected results, while security mechanisms like login authentication and data protection were reviewed to ensure integrity and safe usage.

Performance Efficiency

Focused on the system's response time, throughput, and resource utilization under various usage scenarios. Using tools such as Google Lighthouse and Apache the system's performance was evaluated during peak loads, ensuring that it remained stable and responsive even with multiple users simultaneously accessing exams or downloading materials.

Compatibility

Ensured that the system operated effectively across different platforms, browsers,

and devices. Cross-browser testing (e.g., Chrome, Firefox, Edge) and mobile responsiveness checks confirmed that users could interact with the system without functional or visual discrepancies, regardless of their chosen environment.

Usability

Usability was examined through user feedback and heuristic evaluation. The system interface was designed to be intuitive and user-friendly, with clear navigation and accessible design elements. Attributes such as learnability, operability, and understandability were prioritized to enhance the user experience for both students and coordinators.

Reliability

The system's reliability was validated by monitoring its ability to operate without failure under expected conditions. Features such as auto-save for practice exams, secure file handling, and stable session management contributed to system availability and reduced risk of disruption. Metrics like uptime and error logs were tracked to assess system stability.

Maintainability

Involved examining how easily the system could be updated or modified to adapt to future requirements. Modular coding practices, use of comments, and clean architecture supported the system's analyzability and testability. Future updates such as new exam formats or program expansions can be implemented with minimal disruption.

Portability

Confirmed that the system could be deployed in different environments with minimal adjustment. The use of standard web technologies ensured that the platform could be installed and run on various hosting services. Its adaptability makes it suitable for use by different institutions or expansion to other engineering programs.

Evaluation

To find out how helpful and effective the Engineering Licensure Review System really is, we'll be getting feedback from the people who will actually use it. These will mostly be graduating students from the Bachelor of Science in Agricultural and Biosystems Engineering (BSABEN) and Bachelor of Science in Geodetic Engineering (BSGE) program at BASC, since they're the main users. We'll also include a few instructors who are involved in uploading and managing the review content. We plan to gather around 30 to 50 participants, depending on how many students are available when we roll out the system. These people were chosen because they're directly using or managing the system, so their feedback will be the most useful. We'll be asking them about things like how easy the system is to use, if the practice exams feel like the real thing, and whether the materials are actually helping them to prepare. We'll also be checking how the system performs—like how fast it loads, If there are any bugs, and how smooth everything runs. Their feedback will help us fix issues, improve features, and make sure the system is really useful before a full launch.

Implementation Plan

The project implementation follows a structured plan to ensure a smooth and efficient deployment. A contingency plan will be in place to address the potential risks, issues, minimizing disruptions and ensuring the system stability. A checklist will be utilized to verify the system readiness also ensuring all components functions correctly before launch. The infrastructure and deployment phase will focus on the system and integrating it with existing review processes, uploading the reviewer of the students, also uploading the questionnaires, and monitoring the chart of students that will failed and passed.

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