LearnIT: A Supplemental Learning Resource Management System for Sustainable Learning

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Chapter 1

PROBLEM AND ITS SETTING

Background of the Study

Education is important to the students because it prepares students for the social responsibilities they will have in the future. Universities or institutions aim to offer the kinds of quality that best suits the requirements of both learners and society. Nowadays, education in our country has different aspects in which the students should learn in order to adapt to our society. Continuous learning also helps students to keep pursuing their personal and professional development goals. Professors and students should have a good relationship inside the university so that teaching and studying can be very easy to both students and professors. According to the quote "No matter where you are in your college journey, fostering strong professor and student relationships is important for your future" – Ben Kissam (2023). Many students end up with professors as lifelong mentors and supports. In order to have a good relationship between professors and students, they should have a good communication when it comes to their studying. Giving learning materials to the students ahead of time can be one of the important part of professors and students' communication. Learning materials is important because learning materials can significantly increase learners' achievement by supporting learning.

Having a learning resource management system is significant to the students. It provides an important learning opportunity to support the educational learning programs of the students (CHRISFRUSA, 2023). Implementing such system can be a big contribution to the field of education. By offering freely accessible learning resources, the learning resource management system might help in improving the

educational process. A learning resource management system, which systematically organizes a learning resource, can maximize their effectiveness through management and utilizing them to the greatest capacity.

In the present condition of education, learning materials are given to the students but professors had a little hint if the students are reading the materials that are given to them. It is important for the professor to know if the students are studying and reading the materials that are assigned to them. By giving the learning materials ahead of time, it can help students to have an advance understanding to the topic that will be taught to them. Also, if a professor gives the learning materials to the students ahead of time, it will be easier to the professors to teach the lesson since the students have an idea already about what the lesson is.

Due to technological improvements, the educational landscape has undergone considerable changes in the digital age. Technology's integration into education has transformed both teaching techniques. By developing a web-based system Learning Resource Management System for Sustainable Learning, reviewing and advance reading of lessons and also, tracking the student's progress of reading the learning materials will be simplified. Teachers can be able to check if the students already read the materials that was given to them. Also, the students can read the learning materials that will be taught to them in advance, communication has been improved, relationship between professor and student are better and educational outcomes are generally enhanced.

By developing comprehensive and user-friendly system to handle and monitor student's reading progress effectively, the researchers developed a supplemental Learning Resource Management System for Sustainable Learning which seeks to

satisfy the changing needs of students, teachers and the needs of educational institutions or universities. The system is a web-based system that can be used by schools or universities anytime and anywhere. The system will be used to add the information about specific courses and most importantly, to add the learning materials that the students need to learn.

Objectives of the Study

The objective of the study is to create and develop a web-based learning resource management system, where the professors can view the reading and learning progress of the students. And the students can read and review the learning materials ahead of time.

Specifically, the study aimed to:

1. Design a web-based learning resource management system with the following features:

   a. Student and teacher's dashboard where students and teachers can see the class tab, quiz tab, assignment tab, student's reading/learning progress, chat, and profile.

   b. Registration form for both students and professor where they need to register first to have access to the system or user account.

   c. Class section where students can find their class/course and the materials. Also, in this section, teachers will add the class materials that the students need to read. Both students and teachers can see the reading and learning progress.

   d. Quiz section where students can access the quizzes and, this is the section where the teachers will going to upload the quizzes.

e. Assignment section where students can view and submit the assignment, also this is the section where the teachers will upload the given assignment.

f. Progress section where students can view their progress for each class subject and class reading materials. Also, this is the section where the teachers can view the student's progress.

g. Chat section where students can interact with their teachers.

2. Create a A Supplemental Learning Resource Management System for Sustainable Learning using the following tools:

    - Xampp

    - PHP

    - Mysql

    - HTML

    - CSS

    - Java Script

    - Bootstrap

3. Test and improve the system's features, maintainability, and functional suitability.

4. Define the level of acceptability using ISO 25010 evaluation instruments and quality software models.

Scope and Delimitation of the Study

The study focused on implementing a web-based learning resource management system. The system can be used by students and teachers at any schools or universities.

The study focused on implementing a web-based learning resource management system. The system enables specific users which are the faculty or professors/teachers and the students which gives the system access to a dashboard with information such as the class section, class resources, assignments, quizzes and student's progress. The system can be used by students and teachers at any schools or universities.

The system consists of two sides which are the student side and teacher side. Each side has a login or register section, class tab, quiz tab, assignment tab, progress tab, chat section, and profile tab. In students' side, the class tab consist of class course or subject which students can join new classes. Also, in class tab, when a student clicks a specific class, the system will show the class resources, quizzes, and assignments. When a student clicks the class resources, the system will show the reading materials and the progress of the student's reading at the bottom. Also, each module has a reading time so that the teachers will be able to know if the students read the module. The quiz part inside the class will be unlocked if the students already finish reading the module. In the progress tab, students can view their reading progress history including the reading time.

In teachers' side, the class tab is where the teachers will create a class/subject and teachers will add the reading materials in this tab. If the professor clicks a specific class, the system will show the student's reading and learning progress and the reading time of each reading materials. The teachers will upload and check the quizzes and assignments in quiz and assignment tabs. The system will have a chat section where the students and teachers can interact with each other.

The researchers will use operating systems like Windows 7 to 10, or a much higher version. The system development considered least 4gb of RAM and at least intel

core i3 processors. Moreover, the user should have an internet connection, maybe a wireless internet connection or preferably built-in ethernet to connect to the local network and access the website.

The system developed using web development tools such as the XAMPP, PHP, MySQL, HTML, CSS, Java Script, Bootstrap, and involved collecting data from the possible users such as students and professors.

Chapter 2

CONCEPTUAL FRAMEWORK

The review of relevant studies and literature that forms the study's conceptual foundation is presented in this chapter. The operational definition of terms and the conceptual model for the investigation are also included.

Review of Related Literature

This section includes significant studies and articles that supported the researchers in conceptualizing the subject of their study.

Learning Resource Management System

A learning resource system includes all materials that support a student's educational experience and enhance a school's educational program such as libraries; texts; electronic resources; learning resource laboratories and centers; library consortia and interlibrary loan agreements; computers; internet access; research databases; and other similar resources and equipment. The learning resource system can be centralized or decentralized in organization but resources must be easily and readily accessible to students and faculty during and beyond classroom hours, regardless of location or means of delivery.

According to Briz-Ponce and Helfin (2017) Learning and teaching has inevitably evolved from a traditional, classroom-based, textbook-centred, group-learning oriented setting to a more flexible, anywhere-anytime-based, e-learning-resource-oriented personalized learning process leveraging the convenience and omnipresence characteristics of mobile technology.

According to Baturay, 2015, Brahimi and Sarirete, 2015, many universities and educational institutions worldwide are focusing more and more on online learning to embrace this change. Online courses and programs, such as the so-called massive online open courses (MOOCs), are growing rapidly; some of which are provided free to the general public

According to Hongzi Mao (2016), Resource management problems in systems and networking often manifest as difficult online decision-making tasks where appropriate solutions depend on understanding the workload and environment. Inspired by recent advances in deep reinforcement learning for AI problems, we consider building systems that learn to manage resources directly from experience. We present DeepRM, an example solution that translates the problem of packing tasks with multiple resource demands into a learning problem. Our initial results show that DeepRM performs comparably to state-of-the-art heuristics, adapts to different conditions, converges quickly, and learns strategies that are sensible in hindsight.

Dahlstrom and Bichsel (2014) discovered that 72% of the students they looked at chose a blended learning environment combining online and in-person instruction. According to their research, within the past ten years, students have used blended learning settings more frequently, coinciding with the growth in LMS use.

DeVine (2013) Nonetheless, there are a lot of advantages to online learning, like the capacity to continue communicating with kids at a higher level, adaptability in the capacity of educators to serve as mentors and coaches rather than just a director, as well as a stronger feeling of community, all of which could encourage students to be more Successful in an online learning setting as opposed to a real one with rigid scheduling times.

According to Oliveira (2012) In order to improve the process of mediated communication, systematic guidance, and constant monitoring, focused on the formation of skills and attitudes that allow the student to have learning process autonomy in a continuous self-education, the potential that IT offers may bring e-learning closer to the

ITT Technical Institute (2007) Students can now learn whenever and wherever they want thanks to online learning, which is described as an online classroom where learners are free to choose their own speed instructional procedure and possess the freedom to utilize their programs whenever it's convenient to work about matters like obligations to one's family or other jobs. Thus, virtual education has grown to be a crucial part of the educational system.

Bersin, Howard, and O'Leonard (2008) determined that learning management systems (LMS) are a useful and effective manner for educational institutions to manage their operations. An LMS is an intricate, web-based program that offers features and capabilities including learning and content distribution course management, communications services, and assessment.

Fetaji (2007) An e-learning platform called an LMS uses extensive strategic planning to oversee training initiatives within a company to enable online education in a virtual classroom, giving the organization control over students and the kinds of tasks events as well as essential administrative tasks.

AlNajdi (2014) however, the integration of online learning has been sluggish in Saudi Arabia. higher education because traditional methods have been the mainstay of the Saudi higher education system techniques to aid in teaching. Consequently, online education hasn't been utilized as broadly as possible to aid in instruction and learning.

However, LMS has many benefits for pedagogy, which could combine face-to-face and hybrid learning. From the start, Saudi universities and colleges have also been implementing and adapting LMS programs to provide other opportunities for students to study via online learning such as reaching students located in remote or rural areas of the country or to allow students with certain disabilities access to education via the Internet.

Baepler and Murdoch (2010) discovered that universities were using Learning management systems have been creating the required technological instruments that would enable them to spend money on infrastructure and human resources. Nevertheless, the pupil Neither student participation in LMS contexts nor student performance with the material investigated in connection to students' adaption within such educational settings.

A study conducted by Brady et al. on effectiveness of an education-based social networking sites or virtual learning environments in education supported the idea of a great potential of these online educational platforms as a supplementary tool for a face-to-face class. (Brady et al. 2010).

Nicole Anne Espiritu (2021) Today's technology-driven culture and academic institutions use blended learning approaches, learning management systems (LMS), and information and communication technologies (ICTs) to improve student performance and learning. Thus, this study looks into the connection between 188 senior high school students in the Philippines' academic performance and their use of a learning management system. The Pearson correlation coefficient showed that there was no connection between the students' academic achievement and their use of the LMS.

Ryan Ebardo (2010) Determining the impact of Learning Management System (LMS) implementation on student learning outcomes has been one of the main issues facing higher education institutions. This study examines the academic achievement of Jose Rizal University information technology students enrolled in two sections, one of which studied in a regular classroom setting and the other in a blended or online learning environment. This study comes to the conclusion that the LMS intervention helped the students' knowledge acquisition skills after using qualitative analysis techniques to the evaluation findings from both portions.

Web-based System

A web-based application is one that runs on a web browser. As long as you have a browser and an internet connection, it can operate on any platform. It is also known as browser- based applications for this reason. For instance, you can use your PC's web browser to log onto Facebook. Additionally, you can access Facebook through the browser on your smartphone. The web-based application can be compared to software that is an improved version of a webpage. As you are aware, a website often provides information to its readers. You can browse info and use a website with little to no interaction.

On the other hand, an interactive user interface is provided by web-based applications. The sophisticated parameters are adjustable to your preference. Moreover, web-based apps only load once. This means that if you want to view other pages while using a web-based application, it won't refresh itself. You won't need to refresh the page to get to any other pages when you access them.

classroom mode in relation to personal interaction and preserve the distance between teachers and students. Within this framework, information technology offers ever-

increasing adaptability and accessibility to culture, education, and career and personal growth, which helps to form educational system.

Development tools

Xampp

According to EDUCBA, XAMPP is a cross-platform web server that is free and open-source. Cross-Platform, Apache, MySQL, PHP, and Perl are collectively referred to as XAMPP. A well-liked cross-platform web server called XAMPP enables developers to write and test their programs on a local web server. The Apache Friends developed it, and anyone can edit or change the native source code. Among other computer languages, it comes with Maria DB, Apache HTTP Server, and interpreters for PHP and Perl. Because of XAMPP's ease of deployment, developers may quickly and easily set up a WAMP or LAMP stack on an operating system with the added bonus of being able to load popular add-on applications like WordPress and Joomla. Web designers and programmers could test their work on their own computers without the need for an Internet connection thanks to XAMPP, which was designed to be used as a development tool. To make this as simple as possible, many important security features are by default disabled. The Internet's web pages are served via XAMPP. Along with other databases, it can be used to build and modify databases in Maria DB and SQLite. An FTP client can connect to a local host and treat it as if it were a distant host once XAMPP is installed. Use a program like FileZilla to install content management systems like Joomla or WordPress. Additionally, an HTML editor can be used to establish an FTP connection to a local server.

PHP

According to Wikipedia, Personal Homepage was the earliest definition of the acronym PHP. However, it is now an acronym for hypertext preprocessor. On a web server, PHP code is often interpreted by a PHP interpreter that is implemented as a module, daemon, or Common Gateway Interface (CGI) executable. Any type of data, such as produced HTML or binary image data, might be the outcome of the PHP code being interpreted and executed on a web server and would make up all or a portion of an HTTP response. To organize or facilitate the development of that answer, a variety of web template systems, web content management systems, and web frameworks can be used. PHP is also useful for a wide range of programming activities that are not related to the web, like the control of robotic drones and standalone graphical apps. Using the command line, PHP code can also be executed directly. The Zend Engine-based default PHP interpreter is free software distributed under the PHP License. Since PHP has been widely adapted, it can be used on the majority of web servers across many different platforms and operating systems. Without a defined formal specification or standard until 2014, the PHP language evolved with the initial implementation serving as the de facto standard that subsequent implementations tried to match. Since 2014, efforts have been made to formalize the PHP specification.

According to W3Techs, as of January 2023, "PHP is used by 77.8% of all the websites whose server-side programming language we know." Only 8% of PHP users are said to utilize the 8.x versions that are still officially supported. The majority use PHP 7, notably PHP 7.4, which is not maintained, while 23% use PHP 5, which is not supported with security fixes and is known to have significant security flaws. However, given that Linux distributions like Debian offer protection, this does not always mean that these websites are susceptible.

MySQL

According to Talend, One of the most well-known technologies in the current big data ecosystem is MySQL. Given that MySQL is sometimes referred to as the most popular database and is currently being used widely and successfully across all industries, it is obvious that anyone working with enterprise data or general IT should at the very least strive to become something familiar with MySQL.

Even those who are unfamiliar with relational systems can quickly construct robust, secure, and quick data storage systems using MySQL. The programmatic interfaces and syntax of MySQL serve as excellent entry points into the world of other well-known query languages and structured data storage.

Structured query language (SQL) is the foundation of the relational database management system (RDBMS) MySQL, which was created by Oracle. A systematic collection of data is called a database. Anything from a straightforward shopping list to a photo gallery or a location to store the enormous volumes of information in a business network may be it. A relational database, in particular, is a digital repository that collects data and arranges it using the relational paradigm. In this paradigm, relationships between data items all adhere to a rigid logical structure, and tables are made up of rows and columns. A set of software tools used to implement, manage, and query such a database is known as an RDBMS. MySQL is a key component of many of the most widely used software stacks for creating and sustaining anything from robust, data-driven B2B services to customer-facing web apps. Due to MySQL's open-source nature, dependability, and broad feature set, as well as continued development and support from Oracle, it is used as the backend by a number of key websites, including Facebook, Flickr, Twitter, Wikipedia, and YouTube.

HTML

According to TheServerSide, HTML (Hypertext Markup Language) is a text-based language used to describe the organization of material in an HTML file. The markup on a webpage instructs a web browser how to display text, images, and other types of multimedia. The World Wide Web Consortium (W3C) has made HTML a formal guideline, and most popular web browsers, including those for desktop and mobile devices, generally follow this proposal. The most recent version of the specification is HTML5.

A text file marked as HTML should be interpreted as such by a computer and a web server since it follows specified syntax, file, and name conventions. A user can create and design a simple webpage and upload it to the internet by applying these HTML principles to a text file in almost any text editor. The inclusion of a document type declaration at the start of the text file is the most fundamental HTML convention. As the part that explicitly tells a computer that this file is an HTML file, it always comes first in the document. Typically, the document heading looks like this: <!DOCTYPE html> Always write it that way, without adding additional material or fragmenting it. A computer will not identify any material that comes before this declaration as HTML.

CSS

According to TechTerms.com, HTML webpage content can be formatted using the style sheet language CSS. Separate from the actual content, CSS style sheets can specify how text, tables, and other elements should look and be formatted. Styles can be found in the HTML code of a webpage or in a different document that is referred to by several webpages. Using CSS, web designers may give a website a consistent appearance throughout. A style is defined only once in a CSS style sheet, as opposed to

setting the appearance of each table and block of text in the HTML code of a webpage. Custom styles can be developed and applied to text, graphics, and tables. Common HTML formatting tags, such as <h2>, <strong>, and <em>, can have custom formatting defined in a CSS file. Any page that connects to the CSS file can use a style that has been defined. In order to make it simple to alter styles across multiple pages at once, CSS separates the text from the formatting of a webpage. You simply need to alter the style once in the CSS file, for instance, to change the body text size from 10pt to 12pt across dozens of different HTML pages. Every time the style is used on a page that uses that style sheet, the font size changes.

JavaScript

According to Code Institute, Text-based and server- and client-side compatible, JavaScript is a programming language. It manages multimedia on web pages and enables interaction. A developer may do a variety of things with JavaScript, such as automatically updating material on a page or adding animation to images.

The great majority of websites you visit let you interact with them thanks to JavaScript. It's highly likely that JavaScript programming is what enables you to complete forms, look through maps, or register for events.

For instance, if you're on a website with a JavaScript-powered shopping cart, you'll notice that it displays the complete cost of your desired purchase, including taxes, shipping, and other fees, right away. Before sending your credit card information across the internet to the bank for processing, JavaScript first checks to see if it is legitimate.

Bootstrap

According to F5 Studio, Initially developed by Twitter developers for internal usage, Bootstrap was eventually made available to the public and developed into a

useful set of tools for creating user interfaces of any complexity. Web developers now use Bootstrap, an open-source, free HTML, CSS, and JS toolkit, to rapidly and efficiently generate flexible website layouts. Great bootstrap web design examples may be found on specialized websites like Award. There are numerous benefits to using Bootstrap while creating websites. Companies as a whole as well as freelance developers use the Bootstrap framework. Its primary use is in the creation of admin interfaces and front-end component websites. The most well-known of related systems is the Bootstrap framework. Bootstrap is really just a collection of CSS and JavaScript scripts. There are several classes and pre-made components that may be used for design layout when a Bootstrap web developer connects these files to the page. They are quite useful in the development of contemporary websites with responsive web design.

Ajax

According to geeksforgeeks, AJAX stands for asynchronous javascript and XML the user to make a request to the server for the data without any reloading and without block, any other request also so provide a smooth performance to fetch the data to the server and show to the page.

JQuery

According to geeksforgeeks, this javascript library makes everything easy and provides a very effective method for doing something in the front end and gives many essential features like browser event handling, DOM animations, Ajax interactions, and cross-browser JavaScript development.

Evaluation Instrument

The evaluation instrument model which categorizes the software to evaluate the functional suitability, reliability, performance efficiency, usability, security, compatibility, maintainability, and portability.

ISO Software Quality Indicators

ISO 25010, titled "Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models", is a software quality standard. It describes the models, consisting of characteristics and sub-characteristics, for both software product quality, and software quality in use together with practical guidance on the use of the quality models.

ISO 25010 is software quality model includes:

- **Functional Suitability** -refers to how well a product or system is able to provide functions that meet the stated and implied needs.
- **Reliability** - refers to how well a system, product, or component performs specified functions under specified conditions.
- **Performance Efficiency** - refers to the performance related to the amount of resources used.
- **Usability** - refers to how well a product or system can be used to achieve specified goals effectively, efficiently, and satisfactorily.
- **Security** - refers to how well a product or system protects information and data from security vulnerabilities.

- **Compatibility** - refers to how well a product, system, or component can exchange information as well as perform its required functions while sharing the same hardware or software environment.

- **Maintainability** - refers to how well a product or system can be modified to improve, correct, or adapt to changes in the environment as well as requirements.

- **Portability** - refers to how well a system, product, or component can be transferred from one environment to another.

Related Studies

In the study entitled "Online Learning Management System" Sai Karan Reddy Kankunta (2022), websites for online learning have fundamentally changed how people learn and seek for courses. Both educators and learners can now look for and sign up for courses from the comfort of their own homes. An online learning platform can be used by the instructor or student to identify courses that fit their professional goals and areas of interest. Through the use of the internet, an Online Learning Management System may greatly enhance both the instructor's and student's course enrollment process. In recent years, finding and enrolling in a course has been easier, faster, and more accessible.

The availability of an extensive range of subject areas for the courses is one of the main advantages of enrolling in an online school. Simply checking in and looking through the courses on the dashboard allows anyone interested in taking courses to sign up for a variety of courses. Aside from that, students can access their courses at any time by visiting the student homepage after logging into the web application. In a similar vein, online course enrollment tools could help teachers speed up the enrolling

process. With only a few clicks, instructors may quickly create, modify, or disable their courses in the online application. Online learning management systems help them save time and effort as a result.

Participants in the proposed Online Learning Management System can register as both teachers and students. There are distinct duties allocated to instructors and students. A list of courses is displayed to the student, who is free to apply to those that interest or align with their intended career path. In a similar vein, when students buy a course, teachers have the ability to add additional courses and monitor their earnings in the dashboard.

In the study entitled "Developing a learning management system using single page application architecture" by Ivan Leontev (2020), One of the things that has a significant influence on education, particularly through e-learning platforms, is the growth of the IT industry. The COVID-19 pandemic in 2020 made these systems even more crucial for the school sector. This thesis demonstrated the process of developing

a single-page application in order to fulfill its objective of describing the development process of a learning management system platform. The study also attempted to investigate the MVC pattern and offer a set of ideas and recommendations for additional system enhancement. A working single-page application prototype that complied with all specifications established throughout the system's design phase was the tangible outcome of the thesis.

In the study entitled "Effectiveness Of Learning Management System In University Of Science And Technology Of Southern Philippines Cagayan De Oro And Villanueva Campuses: A Policy Recommendation" by Maria Farina V. Roa (2023), Learning Management Systems (LMS) is gaining momentum in the Philippines as

educational institutions and businesses seek to provide flexible, accessible, and cost-effective training solutions. The Commission on Higher Education mandates the adoption of LMS in higher education institutions. This is based on CHED Memorandum Order No. 04, Series of 2020, which outlines the policies, standards, and guidelines for the establishment and operation of e-learning programs in HEIs. The government's push towards digital education and the growing adoption of cloud-based solutions are driving the growth of LMS in the country. However, there are still several challenges that need to be addressed, particularly in terms of digital infrastructure and teacher training and support. This study examined e-learning in higher education and motivation as variables that affect student learning. The study showed the importance of user-friendly LMS interfaces and technical support, and the crucial role of faculty members in supporting and enriching the learning experience through the LMS.

According to Yousef Almoslamani in their study entitled "Effectiveness of Student Engagement Using Learning Management System in the Blended Learning Environment at Management System in the Blended Learning Environment at Saudi Electronic University Saudi Electronic University (2018). Higher education is using learning management systems (LMS) more and more, but research on how much participation affects student results is still in its infancy. This dissertation examined the connections between learning outcomes and student involvement in Saudi Electronic University's blended learning environment. It made use of student self-reported data from LMS activities, paying particular attention to whether gender affected the degree of engagement and caliber of the product. In order to examine the association between students' grade point average (GPA) and the perceived hourly amount of time they spent engaging in LMS activities, this dissertation employed a quantitative approach.

Additionally, the Students' Engagement Questionnaire was used in this dissertation to gauge how engaged students felt with the internet.

The goal of the current study and the previously mentioned studies on learning resource management systems is similar: by using the system, which requires only registration in order to attend a class, users can save time and effort. The benefit of LeartIT: A Learning Resource Management System is that it can track students' progress in reading the learning materials that teachers assign. After reading, you must complete a quiz to enhance your review experience. This is a good way for a learning resource management system to make sure that students are reading the resources for their learning progress. You can also view the dashboard and other activities that are available to improve your learning experience.

Conceptual Method

Three system components, input, process, and output are part of the study's conceptual model. To accomplish the objectives of the study, certain systemic components are essential.

INPUT	**PROCESS**	**OUTPUT**
Knowledge Requirements	Waterfall Software Development:	LearnIT: A Supplemental Learning Resource Management System for Sustainable Learning
- Learning Resource Management System	- Requirements	
- -HTML, CSS, Javascript, Bootstrap	- System Design	
- -PHP	- Implementation/ Development	
- JQuery	- Testing	
- Ajax	- Deployment	
- Web Browser	- Maintenance	
- Web-based System		
Software Requirements		
- MySqL		
- Xampp		
- Visual Studio Code		
Hardware Requirements		
- At least 4gb RAM up		
- Windows 7 to 11		

EVALUATION

Figure 1. Input, process, Output of the System

Input

Knowledge requirements, software requirements, and hardware requirements are necessary for the study's input phase. The study includes both the web programming languages used to develop the system and the knowledge prerequisites needed to comprehend it. The system needs MySql, Xampp, Visual Studio Code, and a web browser as its software components. The specifications of a computer required to access the system are known as the hardware requirements.

Process

The process phase outlines the system planning and data gathering, system design, system creation, and system testing components. System planning and data gathering is where we make our plan on how to start our system and gather crucial information. System design is where we make our layout for our system. System creation is the actual making of the system; this is the time we do the coding for our system. System testing is where we test our system to see if it is functioning as intended and if there are any errors or other things that need to be improved.

Output

The finished system is the output phase with the inputs and procedures. "LearnIT: A Learning Resource System for Sustainable Learning" which was developed by the researchers.

Operational Definition of Terms

The Following terms were operationally defined for better understanding of the study and to utilize the context of describing and discussing the research project.

Quiz - refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students.

Dashboard - dashboard is a tool for condensing different kinds of visual data. Typically, a dashboard's purpose is to present various, linked facts in an easy-to-understand style.

Professor - someone who teaches at a college or university. A professor is officially a teacher of the highest rank, above adjuncts and lecturers, but college students can call them all professors.

Class - a collection of classes or courses that a learner might take to learn a certain skill or gain knowledge on a certain subject.

LearnIT - A Supplemental Learning Resource Management System for Sustainable Learning.

Learning Resource Management – offers the means for DEP ED Regions, Divisions, and Cluster/School levels to have coordinated and integrated access to high-quality materials.

Xampp - Cross-Platform, Apache, MySQL, PHP, and Perl are the acronym's letters, with the Ps denoting PHP and Perl, respectively. It's an open-source online solutions kit that includes Apache modules, PHP, Perl, MariaDB, and delivery for a range of servers and command-line executables.

HTML - The collection of markup symbols or codes added to a file with the intention of displaying it online is known as HyperText Markup Language, or HTML. The markup instructs web browsers on how to display the text and graphics on a webpage.

Bootstrap - a method of installing software on a computer by using a few basic commands that allow the rest of the application to be introduced via an input device.

JQuery - is a feature-rich, compact, and quick JavaScript library. With an easy-to-use API that functions across multiple browsers, it simplifies tasks like event handling, animation, Ajax, and traversing and manipulating HTML documents.

IPO – (Input Process Output) is a visual tool used to describe a workflow, the flow of information, or activities within a system.

Chapter 3

METHODOLOGY

This chapter necessitates the research methodology with the following sections of project design, project structure and operation and testing procedure and evaluation procedure.

Project Design

The study developed a web-based Learning Resource Management System for Sustainable Learning to analyze the progress of the student on reading the modules uploaded by the teacher and monitor the scores the student took right after reading the sources uploaded by the teacher. The system is furnished for both students and professors to keep track of the student's academic performance.

In figure 2, it starts from choosing the account type if the user is a teacher or a student then it will proceed with the log in. Students and teachers can log in with the given credentials and register by filling up the form. Registration forms consist of full name, password, and the email given by the school. It will automatically send a verification code to the email inputted; verification of email was added for security purposes.

In the student dashboard, there are buttons for class, quiz, assignment, progress, chat, and profile. In the class button, students may view what classes are they enrolled to and join to other classes by having a generated code given by the teacher. By clicking the class tab, students may join a class or leave the class. The information of the class they were joined to will be displayed in the dashboard as well as the modules. In the modules given, the percentage of the progress will be shown at the bar. Span of time will be shown after the student analyze or read the modules uploaded and time is

reflected to the account of the teacher and a quiz is followed. In the quiz and assignment tab, information about the clicked tab will be viewable, pending's and completed task is shown. Edit and delete button are allowed in this tab. Progress tab aspects to the progress of the student in each quiz and assignments, chat is available to reach out to the teachers if the student has concerns. Editing of profile is available and log out button appears here.

Hence, dashboard for the teachers consist of tabs for classes, quiz, assignment, chat, and profile. In the class tab, here is where teachers are going to add their subject and their own module for the students to view. Teachers track the progress in the class tab unlike in the student dashboard, where it has its own tab for progress. It displays the approximate time of the viewing of the student and the percentage if the student finished reading the module uploaded by the teacher. The tabs for quizzes and assignments displays the students finished task for each assignment and other information's. Add, edit, and delete buttons are available in this tab. Chat tab for teacher that needs to message the student directly for concerns. Editing of profile is available and log out button appears here.
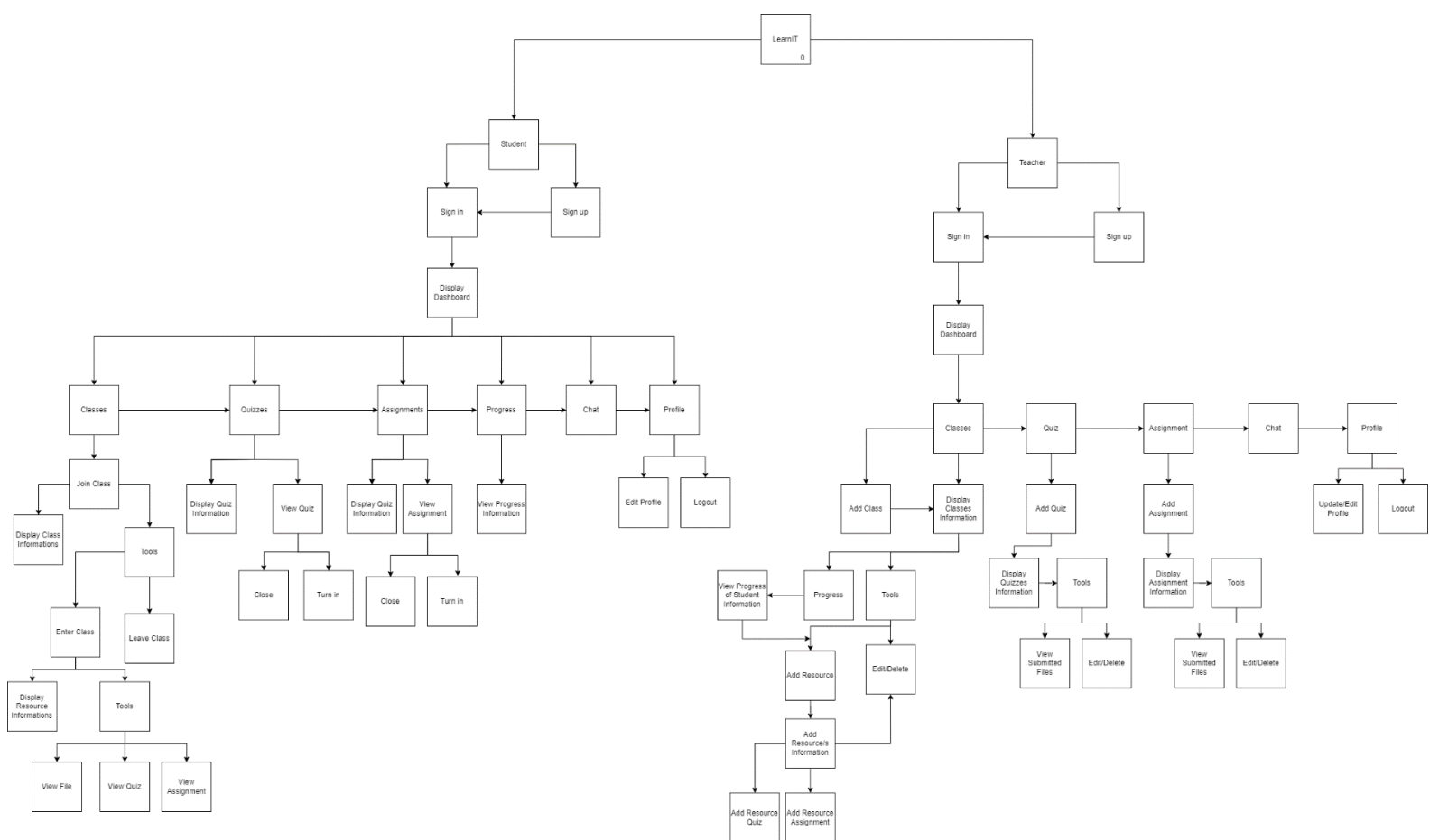
Figure 2. *System Flowchart of Learning Resource Management System*

Software Design

Figure 3 shows that the students and professors will need to log in using their credentials to be able to enter the system. The students and professors need to register first if they have no account yet. Students and professors can interact with each other using that chat section. The professor can view the lists of students. Also, the professor will manage the students.

The professor will add a new class. Once the professor creates a new class, he or she needs to add a new student. In each class, the professor can add a new assignment and new quiz. The professor can view all turned-in assignments and quizzes and then assign grades to each.

The students can view their classes, and in the class section, they can view progress in all assessments. The students can view their assignments and quizzes. Also, the student will be able to turn in their assignments and quizzes.

Moreover, Figure 3 shows the use case diagram of the A Supplemental Learning Resource Management System. It presents a graphical representation of possible interactions between a user and a system. It shows which is often complemented by other types of diagrams as well, the numerous use cases and user types that the system have.
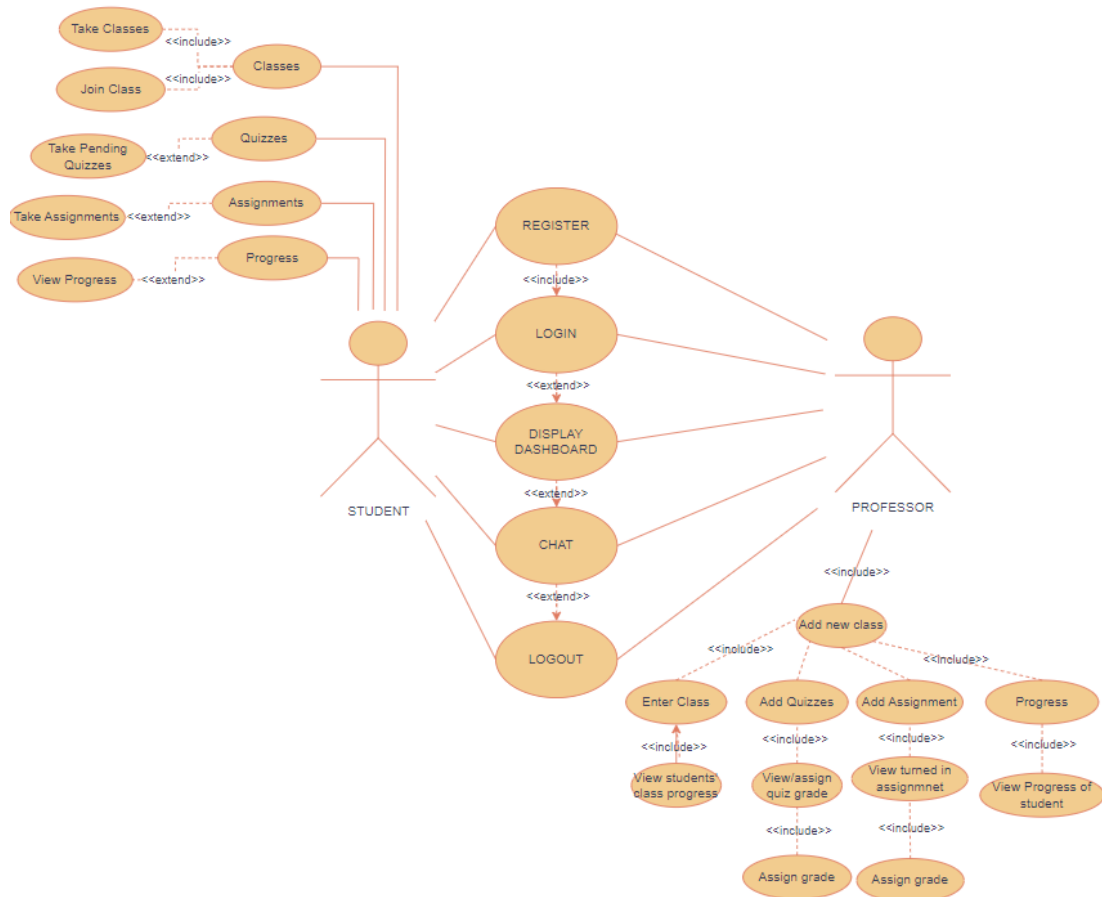
Figure 3. *Use Case Diagram of Learning Resource Management System*

In Figure 4, it shows provided data schema outlines a comprehensive structure for managing user information, authentication, educational content, and quizzes within an academic system. Management and oversight are made easier by this technique.

This section demonstrates and addresses the development processes that were employed to create a system that meets the design specifications. It was created using both XAMPP and PHP. Our system's development uses HTML and CSS as well. It is intended to make it simpler to keep track of how students are doing on their tasks.
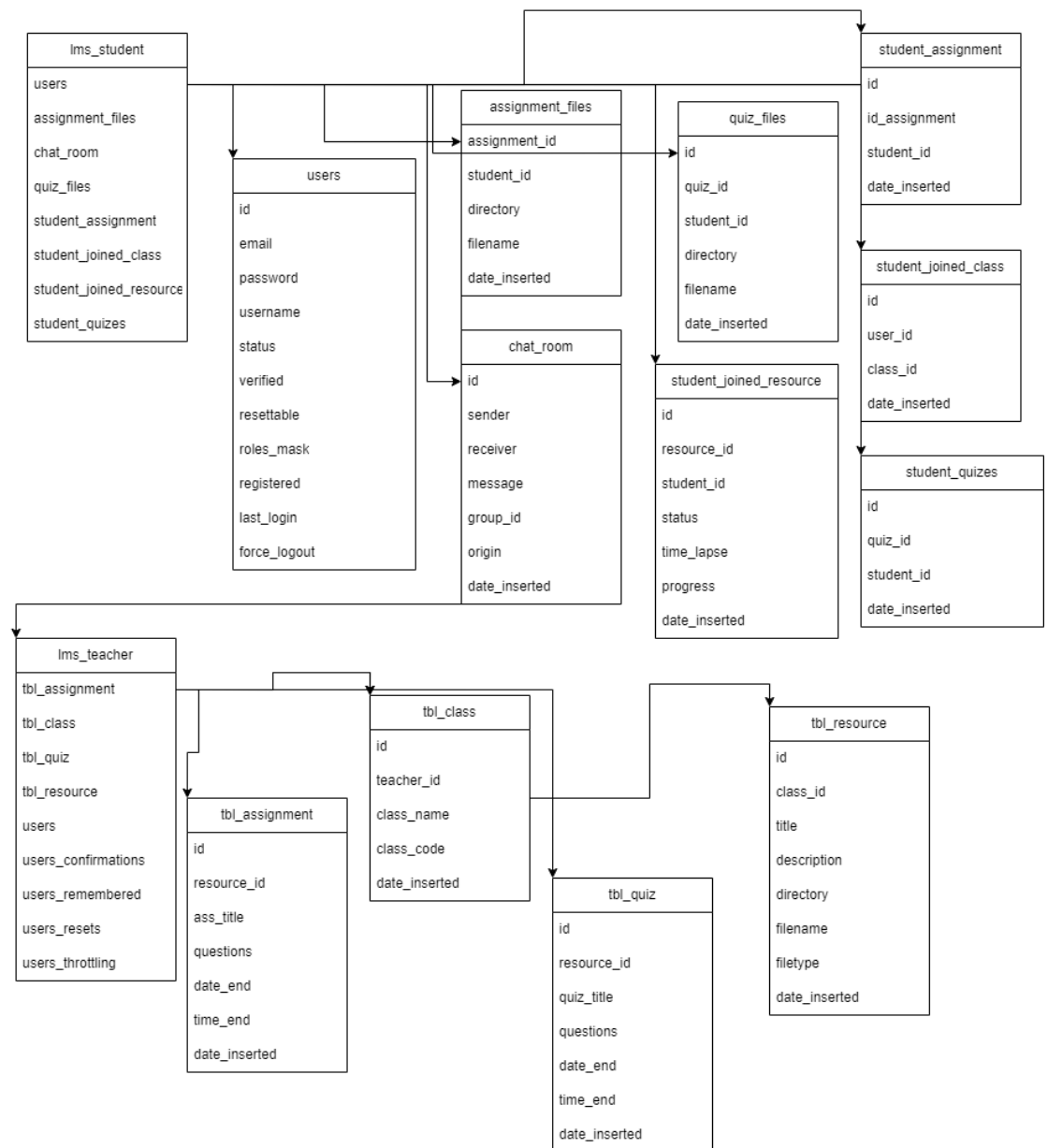
Figure 4. *Database Schema of Learning Resource Management System*

Project Development

The Learning Resource Management System developed in accordance, which consists of six distinct phases: requirement analysis, system design, coding or implementation, testing, deployment, and maintenance. Additionally, the model

incorporates a feedback mechanism, allowing for changes or corrections based on the preceding phase to accommodate required revisions.
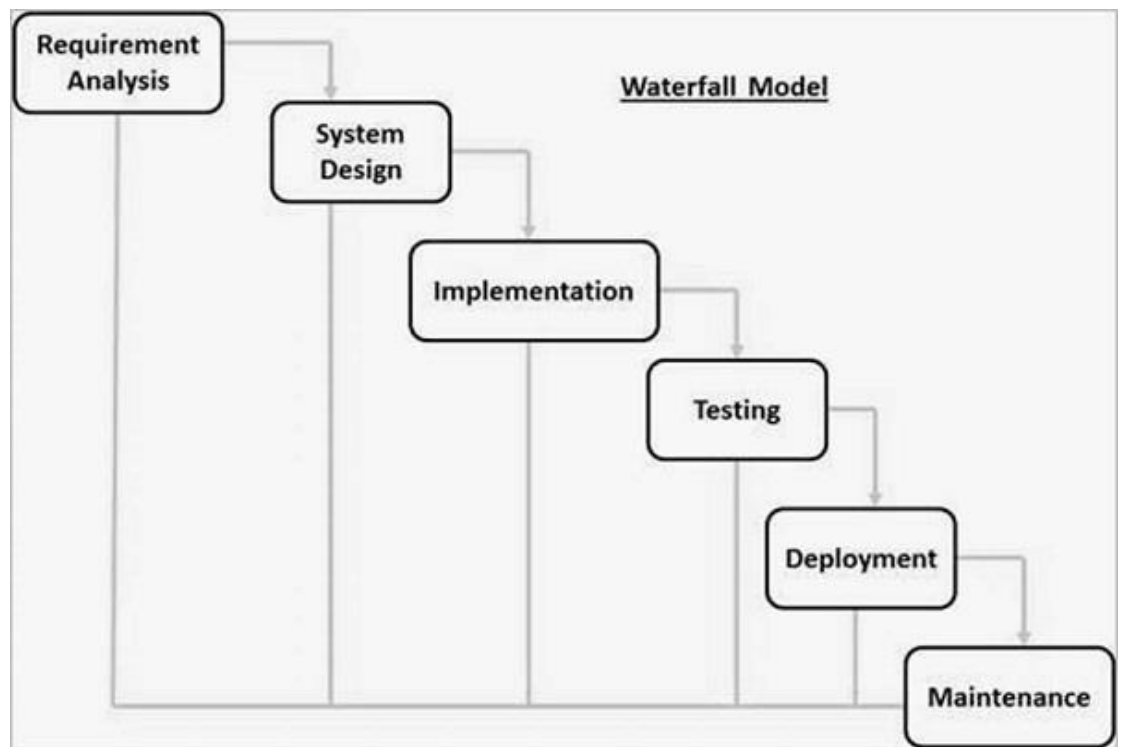
Figure 5: Waterfall Model of Learning Resource Management System

Phase I. Requirement Gathering and Analysis

The researchers collaborated thoroughly during this first phase to collect and evaluate the software requirements. This involves providing specific requirements and comprehending user demands.

Phase II. System Design

In this system design phase, the software architecture is created based on the requirements. It includes defining interfaces, data structures, software architecture, and system specifications. To develop an outline for the entire system is the researchers' goal.

Phase III. Implementation (Coding)

This phase involves actual coding the software. Based on the design specifications, the researchers' writes code. It is a crucial step where the design is transformed into executable code.

Phase IV. Testing

This phase was executed which includes the maintainability and functional suitability of the system. Testing on how the system works smoothly for the users and unexpected errors were corrected.

Phase V. Deployment

After a successful testing phase, the software deployed in the production environment. Delivering the system to clients or end users is the primary goal of this phase.

Phase VI. Maintenance

During this phase, the program is updated, improved, and any bugs are fixed. It continues to function for the duration of the software, fixing problems that come up throughout the operating period.

Operation and Testing Procedure

The following procedures was undertaken to ensure the system's operation and test its reliability, accuracy, and functionality.

During the testing phase, various resources was employed, including internet access and either a desktop or laptop. The testing protocols conducted focused on assessing functional sustainability and security, and the detailed results are presented in the following tables. These tests involved a comparative analysis between the anticipated and realized outcomes, aiming to verify the system's proper functionality. Table 1 outlines the testing procedure for functionality suitability, while Table 2 delineated the testing procedure for maintainability.

Table 1.

Functional Suitability Testing Procedure

Test Scenario	Steps to be Taken	Expected Output
Access Material	1. Login to the student account. 2. Navigate to the materials or documents section.	The material should be open without errors.
Select Material	3. Choose specific material to open and read it.	The selected materials should be displayed correctly.
Open Material	4. Click on the selected material to open and read it.	Navigation within the material should work as expected
Reading Progress Tracking	5. Verify that the system accurately tracks the percentage of the material read. 6. Check if the tracking is updated in a real-time or upon completion.	If the tracking is real-time, changes should reflect promptly
Post-Reading Quiz Access	7. After completing the reading, access the associated quiz or assessment.	The quiz should be accessible after reading.
Complete Quiz	8. Answer quiz questions related to the material.	Quiz questions should be relevant to the material.
Submit Quiz	9. Submit the quiz and verify if the system records the completion.	The system should record and display the completion of the quiz.

Table 1: Functional Suitability Testing Procedure

Table 2.

Maintainability Testing Procedure

Test Scenario	Steps to be taken	Expected Output
Backup and Recovery	1. Initiate a full system backup and verify that the backup process completes without errors.	Successful backup completion message.
Database Schema Update	2. Apply updates to the database schema and check for any errors during the update process.	Updated database schema without errors.
Error Handling and Logging	3. Trigger a simulated error scenario and check error logs for details and response.	Clear error logs with detailed information, system response to errors is appropriate.
Continuous Improvement	4. Gather user feedback on system improvements and evaluate areas for enhancement.	Positive user feedback, identification of areas for improvement.

Table 2: *Maintainability Testing Procedure*

Evaluation Procedure

1. The evaluation instrument that was used to assess the acceptability of the system was adapted from the ISO 25010 functional suitability testing procedure and maintainability testing procedure and was used as a basis for the survey's criteria checklist.

2. The evaluation procedure was followed to determine the acceptability of the developed web-based system:

3. Twenty-Five (25) selected respondents composed of five (5) high school students, five (5) senior high school students, five (5) information system students and ten (10) information technology students or graduates were invited to evaluate the system.

4. Through demonstrating the system, the researchers show how the system will work and show the other features of the system.

5. The evaluator-respondents were asked to try to evaluate the systems' features.

6. The evaluator-respondents was given a survey questionnaire after the demonstration was completed.

7. The survey will be arranged and calculated using statistical mean.

Chapter 4

RESULTS AND DISCUSSION

This chapter contains the project description, project structure, project capabilities and limitations, test results, and evaluation results.

Project Description

The study developed a web-based supplemental Learning Resource Management System for Sustainable Learning. The system was built to read and track the student's reading progress for the resources that was given by the teachers. Specifically, the system developed for the teachers so that they can ensure the learning progress of the students.
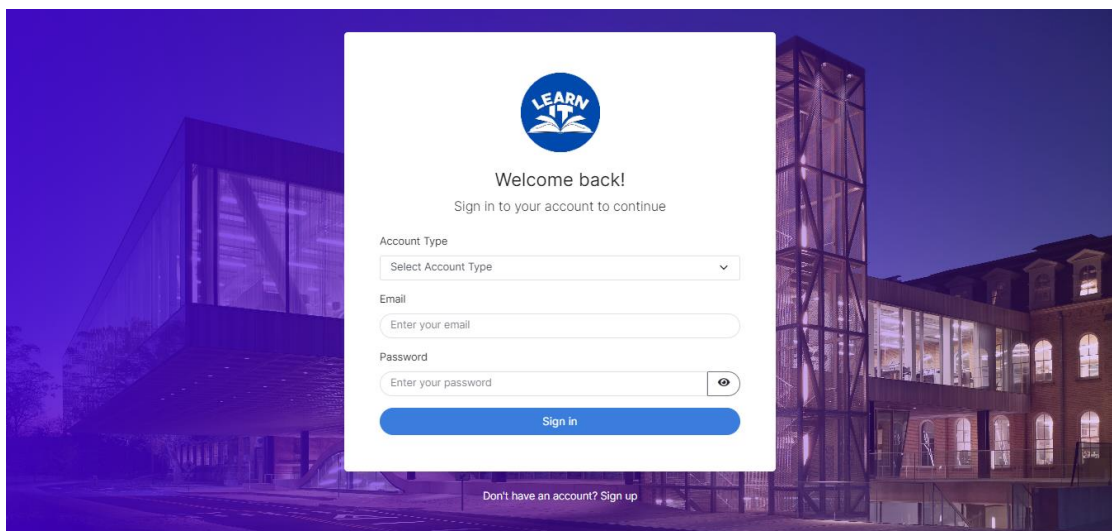
Figure 6: *LearnIT Homepage*

Project Structure

The system was developed with 5 selections: the classes, quiz, assignment, progress, and chat.

a. The System Framework

The framework shows in figure 7 is the Class tab in student side. The student's
class tab is consisting of list of all classes, join class, enter class and leave class.
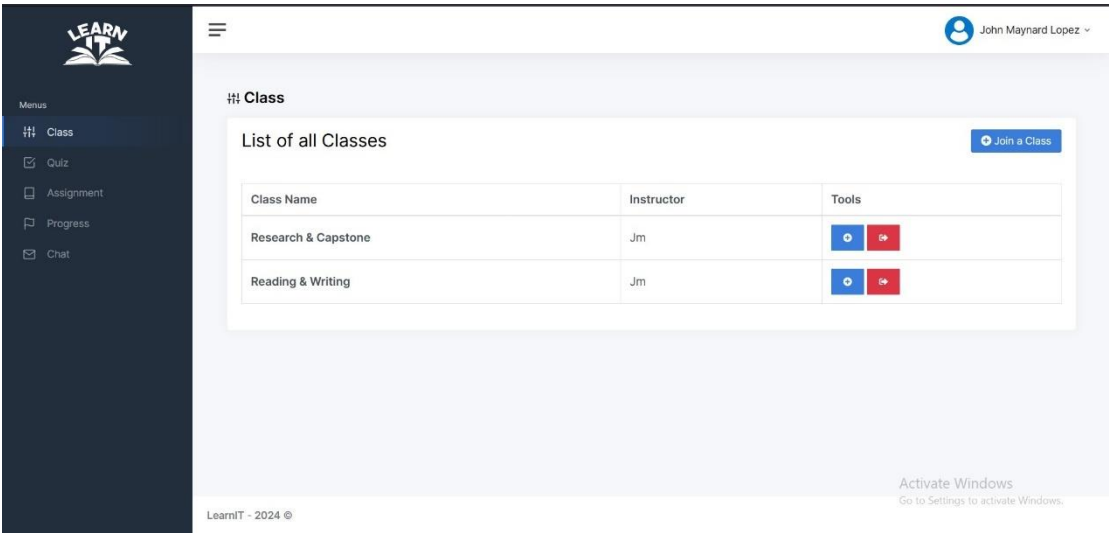
Figure 7: *Student's Class Tab*

Figure 8 shows the List of Classes in the Teacher's Tab. It consists of add class,
view resource, add class, edit class, and delete class button.
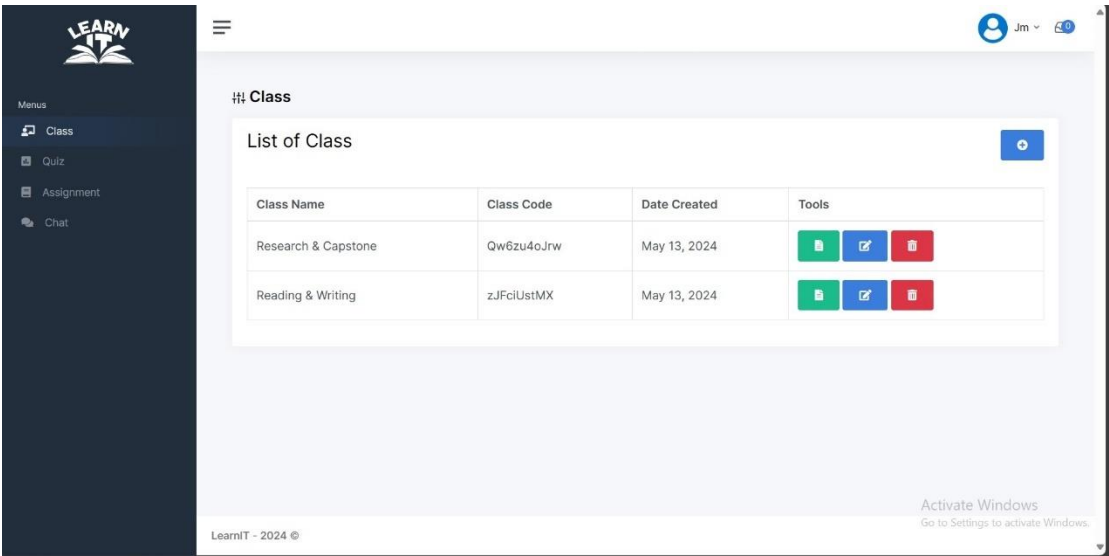
Figure 8: *Teacher's Class Tab*

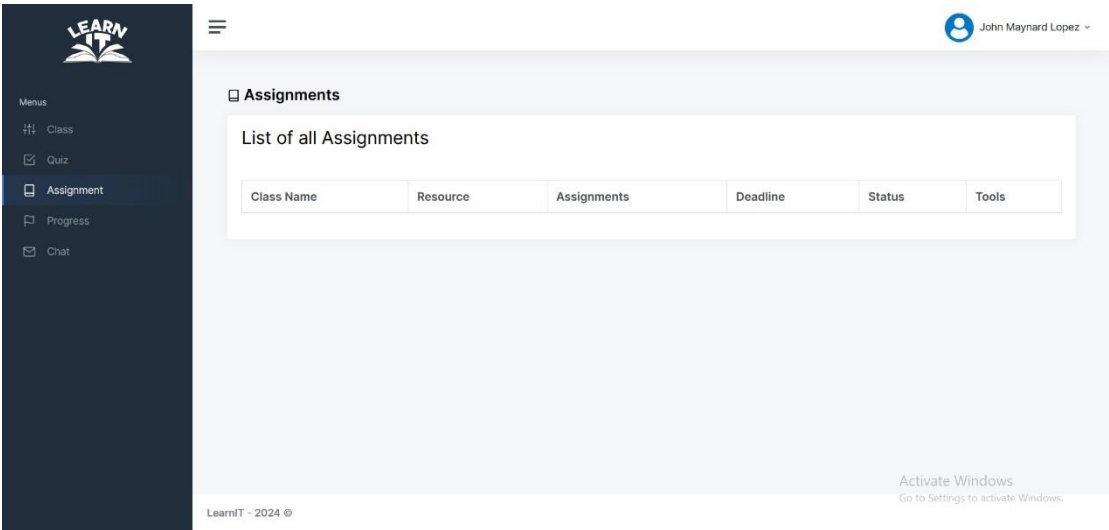The figure 9 shows the quiz tab for students which consists of quiz progress and other information.
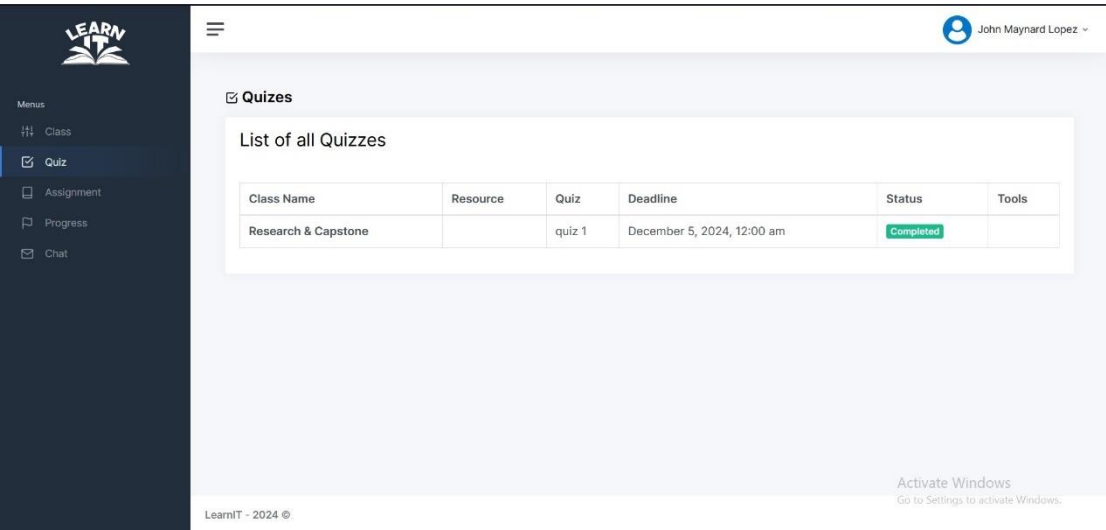
Figure 9: *Student's Quiz Tab*

The figure 10 shows the quiz tab for teacher's side which consists of list of quizzes that the students already submitted.
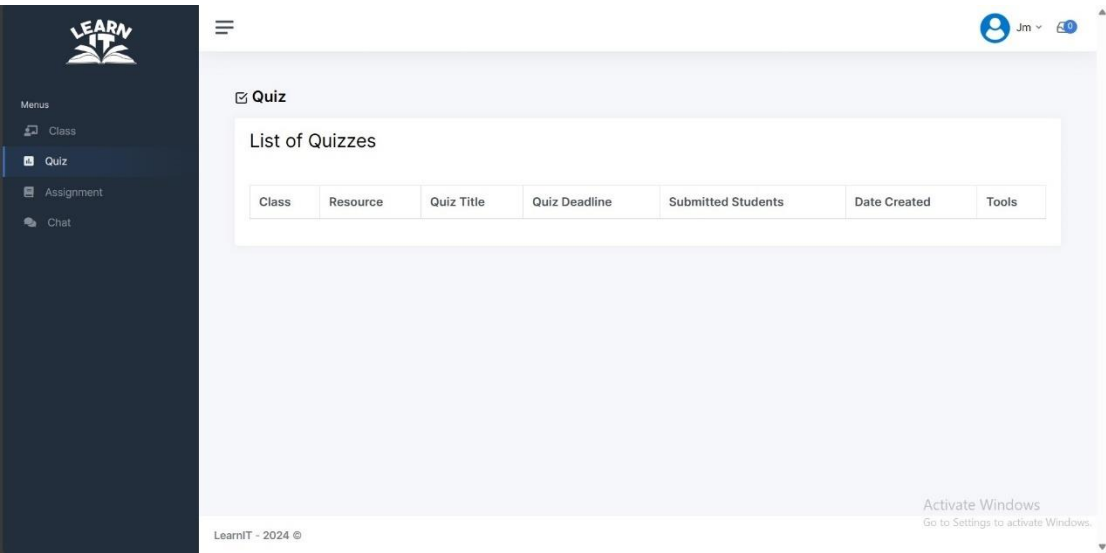
Figure 10: *Teacher's Quiz Tab*

The figure 11 shows the assignment tab for teacher and student's side. They can make changes or modify the assignment.

Figure 11: *Student and Teacher's Assignment Tab*

The figure 12 shows the progress tab for students. It consists of the time information which indicates how long the students read the resources. And also, there's a progress indicator which indicates if the students completely read the resources.
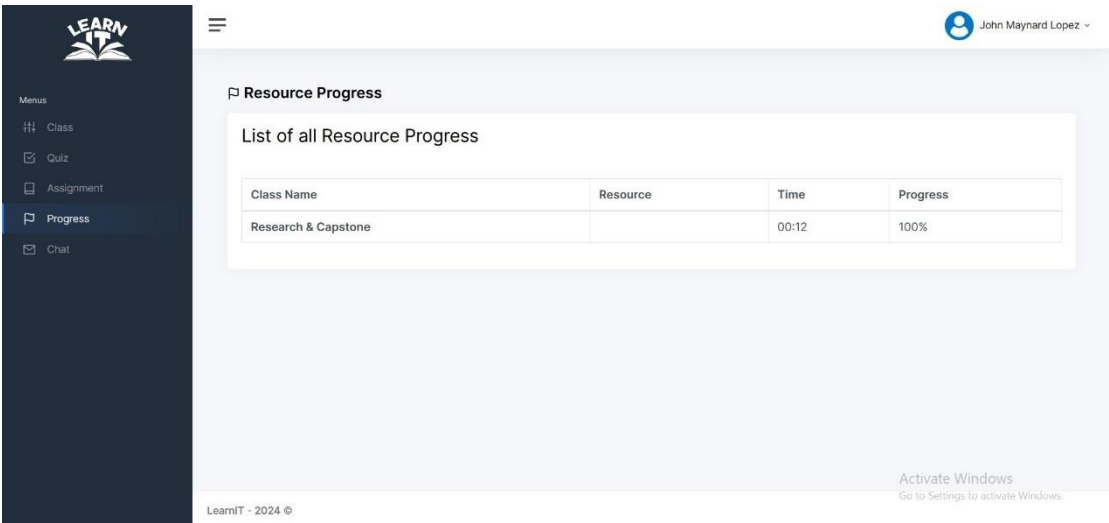
Figure 12: *Student's Progress Tab*

The figure 13 shows the reading progress of the students, and the status if the students read the resources very well. This is indicated in the teacher's progress tab.

Figure 13: *Student's Reading Progress Tab*

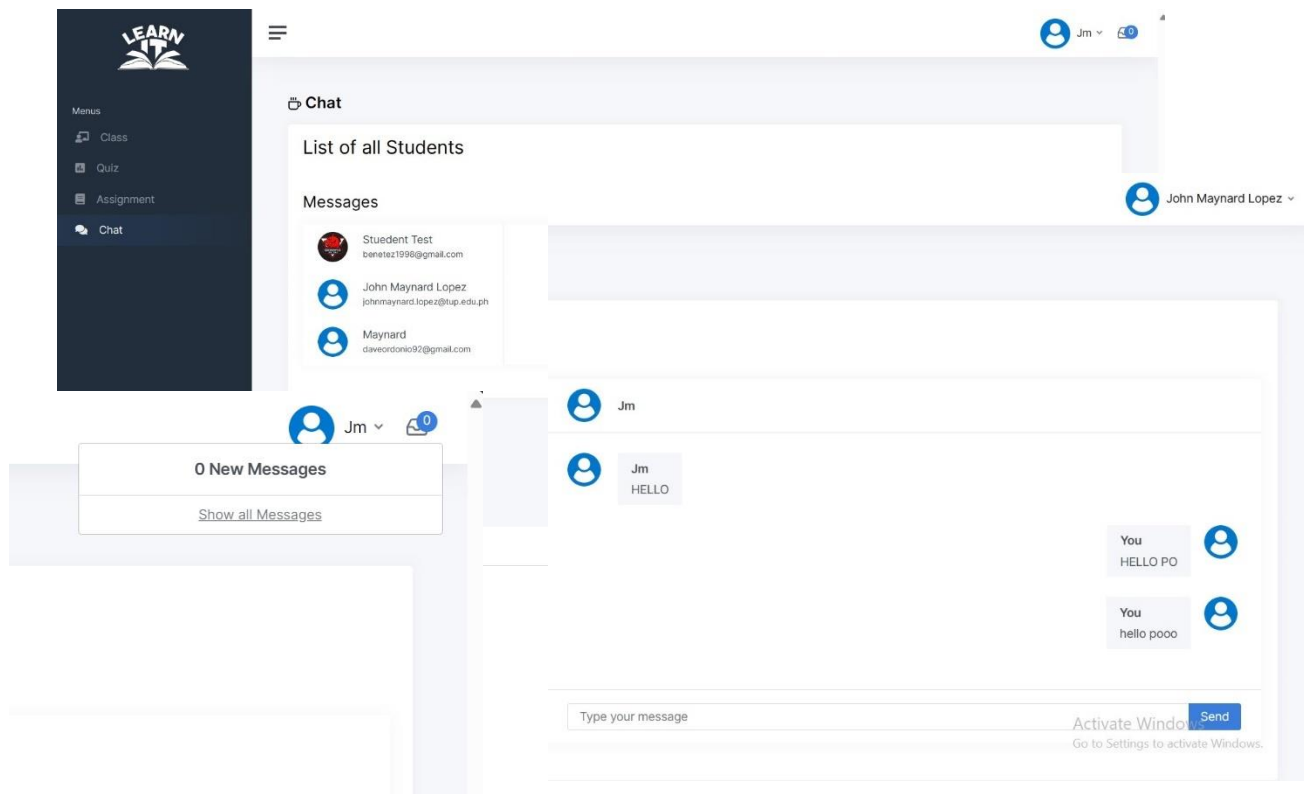The figure 14 shows the sample resources in student's side. If a student opens a reading material, the reading time is being monitored.

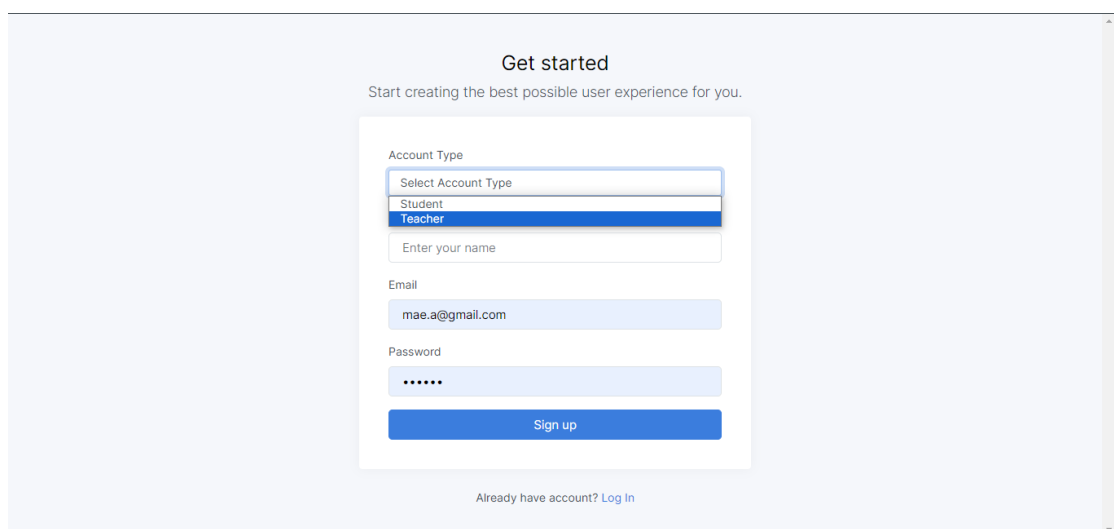*Figure 14:* *Sample Reading Material (Resources)*

The figure 15 shows the chat tab in teacher and student's side.

Figure 15: *Chat Tab*

Figure 16 shows the sign-up page of the system for student and teacher's side.

Figure 16: *Sign-up page*

Project Capabilities and Limitations

The following are the capabilities of the developed system:

1. The system can accept new users and the verification will be sent to the users' email

2. In teachers' side, the system can add new resource file and new class. While in the student's side, the student can join class and can read the uploaded resources.

3. The system can provide detailed information with symbols that can be read for visualization.

4. The submitted files and the progress pf the student can be read by the system.

5. The data for student and teachers' side can be integrated in both sides

6. The assignments that has been turned in by the students can be undone.

7. The files that the students will upload can be in any format.

8. The user profiles, and uploaded resources can be customized.

9. The system can create a class where the students will join using the class code provided by the teacher. This class code can only be seen by the teacher.

The following are the limitations of the developed system:

1. The web-based system cannot be used without internet connection. Specifically, the system cannot be run offline.

2. The system cannot be used without a user account.

3. The quizzes that has been turned in by the students cannot be undone.

4. The system cannot read the uploaded resources if the format is in word file or .docs.

5. The system cannot be used for virtual meetings only for tracking the students' progress.

6. The system is not for announcements purposes.

Test Results

The developed system was created using PHP language, Xampp, MySQL databases. The system can run on Windows 7 or later and in computer desktop's web browser. The test results on the functional suitability and maintainability of the developed system are presented in the tables that follow.

Table 3.

Functional Suitability Testing Results

Test Scenario	Steps to be Taken	Observed Results
Access Material	10. Login to the student account. 11. Navigate to the materials or documents section.	The system opens without errors.
Select Material	12. Choose specific material to open and read it.	The selected materials displayed correctly.
Open Material	13. Click on the selected material to open and read it.	Navigation within the material worked as expected
Reading Progress Tracking	14. Verify that the system accurately tracks the percentage of the material read. 15. Check if the tracking is updated in a real-time or upon completion.	The tracking is real-time, the changes reflect promptly. The tracking is updated in a real-time or upon completion.

Post-Reading Quiz Access	16. After completing the reading, access the associated quiz or assessment.	The quiz is accessible after reading.
Complete Quiz	17. Answer quiz questions related to the material.	Quiz questions is relevant to the material.
Submit Quiz	18. Submit the quiz and verify if the system records the completion.	The system records and display the completion of the quiz.
Leave Class	19. Click the leave class button	The student successfully leave class
Join Class	20. Enter the class code	After entering the class code, the student successfully enter the class

Table 3: *Functional Suitability Testing Results*

Table 4.

Maintainability Testing Results

Test Scenario	Steps to be taken	Observed Results
Backup and Recovery	5. Initiate a full system backup and verify that the backup process completes without errors.	Successful backup completion message.
Database Schema Update	6. Apply updates to the database schema and check for any	Updated database schema without errors.

		errors during the update process.
Error Handling and Logging	7. Trigger a simulated error scenario and check error logs for details and response.	Clear error logs with detailed information, system response to errors is appropriate.
Continuous Improvement	8. Gather user feedback on system improvements and evaluate areas for enhancement.	Positive user feedback, identification of areas for improvement.

Table 4: *Maintainability Testing Results*

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