6CS007- Project and Professionalism Assessment

FYP Report

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Abstract

Technology advancement has ploughed a path into the adaptation of education, allowing more flexibility when it comes to learning that happens online or on a digital platform. LearnIT is a web-based educational platform that uses technology called gamification in the practice of teaching computer science and programming effectively. Designed to overcome such challenges of online education as low engagement, no motivation, or slow progress tracking. LearnIT provides huge motivation through the integration of such elements as quizzes, leaderboards, rewards, and personalized learning paths.

The platform consists of different subsystems, including its user management, content delivery, gamification, progress tracking, quiz modules, and notifications, and the combination brings about an interactive and structured learning experience. The system follows the Scrum methodology, guaranteeing the development in an iterative mode with the flow of user feedback and continual improvement. The single-page frontend is powered by React.js, which is a scalable and efficient single-page application, while the backend is developed in Django, which is secure, efficient, and provides a secure learning environment with Django's inbuilt database to handle this.

The A study of gamification in education, privacy issues in online learning and case study of Duolingo and Sololearn. Data privacy, security, and its compliance with regulations related to digital learning are also analyzed on the ethical and the legal dimension. Black box and white box testing done on the project to establish reliability of the system as well as satisfaction of the user.

The results show a significant positive effect of the gamification on engagement and retention; that is, gamification makes learning happier and more effective. Some of these challenges, which are highlighted in the project, are data security risks and the necessity of adaptive learning techniques. The last section contains self-reflexivity, professional development, as well as opportunities to extend LearnIT in the future. The research and development of this project provides an engaging, structured, and secure learning experience for students, which contributes to modern educational technology.

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1. Introduction

1.1. Project Title
"LearnIT"

1.2. Project Briefing
Computer fundamentals and programming are becoming significant essentials in the present-day context. However, accessible and interesting material for learning these important skills remains limited for many people. So, the main purpose of this application is to provide a user-friendly, entertaining, easy-to-learn experience for users who want to learn the fundamentals of a computer and basic programming, but also includes modules on practical computer shortcuts that are used daily. As a serious spinning game, the app offers lessons that break down difficult concepts into even simpler elements within the quiz, spin-to-learn achievements, and a spinning leader board, respectively. These lessons will help the user to boost their productivity and confidence in using computers effectively.

1.3. Problem Statement
A significant knowledge gap exists for beginners learning about computers and programming. While resources exist, many are text-heavy, lack engagement, or require prior knowledge, which may deter beginners. Existing tools may not provide enough interactivity or gamified elements to motivate users. This project aims to bridge this gap by developing an app that provides an accessible and enjoyable way for users to acquire fundamental computer skills through structured, gamified lessons. Hence, this platform assists in simultaneously learning foundational and practical skills.

1.4.   The Project as a Solution

This application provides a gamified learning experience where users can explore lessons on computer basics and introductory programming. The app engages users and encourages improvement by using interactive elements such as quizzes, matching games, and fill-in-the-blank exercises. Additionally, the app incorporates achievements and a leaderboard to motivate users and promote consistent learning. Security features protect user data, while regular content updates keep users engaged with fresh material.

2. Aims

- Create an application that offers lessons on computer fundamentals and elementary programming using learning games.
- Create a user-friendly UX that supports both the process of movement around the site, as well as the motivation to study the material offered.
- Various features give users feedback as to their advancement.
- Provide users with basic contexts about computing in a manner that inspires them to find out more all on their own.
- Also, it stimulates consistent learning and implementation of skills in day-to-day computer interaction.

3. Objectives

- Make engaging learning activities focusing on computers, along with their shortcuts and programming basics.
- When creating an interface, implement the use of images and buttons.
- An achievement system, a leaderboard, and badges should be introduced as fragments of the gameplay.
- Habits should be formed to go through day-to-day learning by embracing ways such as challenges, streaks, among others.

4. Artefact

This artefact is an online academic application designed to help users learn the fundamentals of computing and programming with entertainment-oriented content. There will be lessons, quizzes, and an interactive board where the user can see their progress. They are: computer orientation, computer typing, and an overview of programming.

4.1. FDD (Functional Decomposition Diagram)
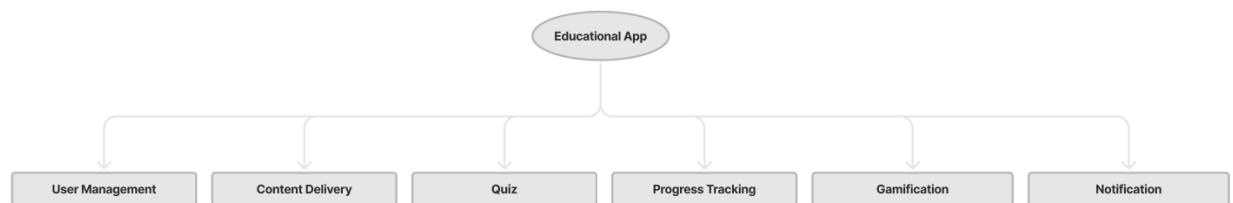
Figure 1Functional Decomposition Diagram

This application is intended for any person willing to improve his/her digital competency entertainingly. Hence, the platform is divided into segmented subsystems, each having a distinct purpose to ensure smooth functionality and versatility.

4.2. Main System: Gamified Computer and Programming Teaching

The main system is the centralization of all functions that assist in providing easy and game-type learning. Lessons and quizzes can be easily observed along with rewards and progress of the users in a user-friendly mode.

4.2.1. Subsystem:

a. User Management Subsystem

Purpose: Is responsible for the user identity and his/her account settings, as well as other preferences.

Features:

- New user registration and existing user login with secure credentials.
- Access control (e.g., admin for managing content).
- Dashboard visualizing the user's achievements and progress.

b. Content Delivery Subsystem

Purpose: Teaches lessons, tutorials, and tips in a logical sequence.

Features:

- Lessons are broken down as either progressive or based on difficulty and include the basic, intermediate, and advanced levels.
- Lesson on daily-use computer shortcuts.
- Beginner-friendly and interactive tutorials for programming lessons.

c. Gamification Subsystem

Purpose: Customer interaction: increases the interest in making the user's activity similar to a game.

Features:

- A system of scoring or gaining points for accomplishing lessons and quizzes.
- Different badges will be awarded depending on the level achieved.
- These include: Leaderboards that are aimed at sparking competition.

d. Progress Tracking Subsystem

Purpose: Supervises the activity of users and shows statistics.

Features:

- An illustration of the completion of lessons and quiz performance.

- Patterns for keeping up continued learning regimes.
- To begin with, the new features came up as follows: Availability of downloadable progress reports. v.

e. Quiz Subsystem

Purpose: Contains quizzes that check users' comprehension through various activities.

Features:

- The exercise includes multiple-choice and/or coding challenges besides match-the-pairs exercises.
- Opportunity to get results immediately with further clarification on incorrect responses.
- Integration with the reward system in the game.

f. Notifications Subsystem

Purpose: Updates users on the current trends and or events.

Features:

- Notifications for incomplete lessons or a missed streak.
- Information on the current position in terms of the leaderboard and the badges that have been attained.

4.3. Product Backlog

Epic	User Stories	Acceptance Criteria	Priority	Sprint
Admin	I want to be able to add admin login so that I can access the admin dashboard.	I should be able to log into the admin dashboard when I enter the valid credentials.	Must be	Sprint 1
User	I want to create an account so that I can access personalized learning and track my progress.	So, I want a sign-up page where I can register my details like username, email, and password. Once submitted, my account should	Must be	Sprint 1
User	I want to log in to my account with my registered email and password so that I can access all system features.	I should be able to log into the website when I enter my username and password on the login page. I should now be able to explore the features of the system.	Must be	Sprint 1
User	I want to log out of my account so that my session remains secure.	When I click on the logout button, my session should expire and I should be redirected to the login page.	Must be	Sprint 1
User	I want to reset my password so that if I forget it, I can still access my account.	Given that I click on "Forgot Password," I should see a form to enter my registered email, and then I should be able to set a new password through an email link.	Should be	Sprint 2
User	I want to sign up using social media platforms like Google and Facebook so that I can register quickly.	When I click on the Google, Instagram, or Facebook sign-up option. I should be able to log in or register using my social media	Could be	Sprint 2
Admin	I want to create and manage lessons and quizzes so that users can access updated content.	I should be able to create, update, delete, and manage lessons and quizzes in the system.	Must be	Sprint 2
User	I want to choose which topic to learn (e.g., Intro to Computers, Frontend programming, Backend programming).	Given that I log in, I should see a list of available courses (Intro to Computers, Frontend Development, Backend Development) and be able to select one to proceed.	Must be	Sprint 2
User	I want to input my knowledge level (e.g., Beginner, Basic Knowledge, Computer Student, Professional) so that the system personalizes my learning journey.	I should see an option to choose my knowledge level so that the system should adapt the lessons to my level.	Must be	Sprint 2

Figure 2: Product Backlog (1)

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User	I want to be able to view the homepage with dashboard and overview of lessons.	When I visit the homepage, I should be able to view the dashboard for navigation and lessons that can be taken.	Must be	Sprint 3
User	I want a button so that I can easily switch the courses.	I want to be able to switch the courses easily.	Should be	Sprint 3
User	I want to open a lesson and view its content so that I can learn the material.	I should be able to view its content, including text, images, and other media as required.	Must be	Sprint 3
User	I want to take quizzes after lessons so that I can test my understanding.	Given that I complete a lesson, I should be able to access a quiz with multiple-choice and fill-in-the-blank questions related to the	Must be	Sprint 3
User	I want to receive real-time feedback on my quiz answers so that I can learn from my mistakes.	I should be able to see instant feedback on whether it was correct or incorrect. If the answer is incorrect, it should explain the correct answer.	Must be	Sprint 3
User	I wish to take quizzes again which I initially failed in order to advance my scores.	Given that I failed the quiz, I should receive another chance to take a quiz when revisiting the feedback from prior attempts.	Should be	Sprint 3
Admin	I want to manage badges and points for users so that gamification can enhance user engagement.	As an admin, I should be able to create, update, and assign badges and point thresholds for specific achievements or completion of daily quests in the system.	Must be	Sprint 4
Admin	I want to configure leaderboard settings so that I can adjust the criteria for ranking users according to their points accumulation.	I should be able to set up leaderboard parameters, such as points, badges, or quiz performance metrics.	Should be	Sprint 4
User	I want to see my learning progress as a dashboard for self-monitoring my educational advancement.	The dashboard must display quiz scores and completed lessons together with earned badges when I log in.	Must be	Sprint 4
User	A motivational system of points and badges that reward should be provided when I successfully complete lessons and quizzes.	When I reach specified achievement points, these developments should appear on my dashboard for monitoring.	Must be	Sprint 4
User	I want to view a leaderboard so that I can spark my competitive spirit.	I should be able to visit a leaderboard displaying the top leader based on points or badge along with my own rank.	Should be	Sprint 4
Admin	I want to utilize email marketing tools for reaching out to users in order to boost their involvement.	I should be able to distribute email campaigns directed at non-active users and upcoming lesson notifications to the users.	Must be	Sprint 4
User	I want to receive notifications about new lessons and pending quizzes so that I stay engaged.	I should receive in-app or email notifications when new lessons are added or when I have pending quizzes.	Must be	Sprint 4

Figure 3: Product Backlog (2)

g. Database Subsystem

Purpose: This means that data storage is carried out in a centralized manner for all the applications.

Features:

- User account information, content to be taught in lessons, quiz results, and the history of users' performance.
- Efficient ways of querying to access data as soon as possible.
- Synchronisation with information/data, which will allow the creation of backups for data integrity.

h. Frontend Subsystem

Purpose: Highlights a friendly and useful interface used to interact with the users.

Features:

- Perceivable feedback for gamified features like progress bars and badges.
- Adaptive to different computing and displaying devices.

5. Academic Questions

- What specific automated algorithms and structures are most effective when applying the concept of gamification to learning applications?
- How can programming and basic computer knowledge be simplified into small lessons that first-time learners understand?
- How can we ensure that users remain interested in the learning process while using educational applications?
- What is necessary to put into practice to ensure the user's learning progress and their personal information have a defense mechanism in the web app?

6. Scope

- Targeting users of all ages interested in engagingly learning computer basics and programming.
- Providing a user-friendly interface with gamification elements like a leaderboard and badges to motivate learners.
- Offering personalized lesson plans based on user progress and performance to tailor the learning experience.

7. Limitations

- Since user input may vary, it may be challenging to gauge the accuracy of each user's progress without additional assessment methods.

- Users need to engage with the app consistently to benefit fully from the learning experience, which relies on self-motivation.

- The app focuses on individual learning; its impact on formal education or broader educational systems may be limited.

8. Report Structure

8.1. Introduction

The following part introduces the LearnIT platform features alongside its target goals and the issue it intends to address. A fully interactive learning system needs to exist that teaches using game-based quizzes and tracks student advancement and tailors the curriculum to individual students. The document presents the first blueprint for managing system development.

8.2. Literature Review

Before LearnIT development commenced, existing research about gamification, adaptive learning, and interactive educational platforms was reviewed. Research papers from Springer, IEEE Xplore, MDPI, ScienceDirect, and other educational tools, including Duolingo, Khan Academy, and Quizlet, were used to collect information about existing solutions and conceptual holes.

8.3. Project Methodology

The following part explains the project development methodology. Using Agile methodology enables the project team to perform iterative work that involves continuous user feedback. The document shows how Scrum and Waterfall compare to each other against Agile as the optimal approach for implementation. The project utilizes a Gantt chart as a tool for both planning and following the process.

8.4. Technologies, Tools, and Techniques

A comprehensive list of technologies and tools employed for development appears in this part. The project backend operates from a Django platform with React.js acting as the frontend system. The project incorporates PostgreSQL as its database platform alongside Django REST Framework (DRF) for developing APIs. The reliability of the project depends on unittest and Jest unit testing frameworks, and NPM and pip serve to manage dependencies.

8.5. Artefact Designs

The artifact contains diagrammatic representations, which include UML diagrams alongside ERD (Entity-Relationship Diagram) alongside FDD (Functional Dependency Diagram) with software architecture models. The system contains drawings of wireframes together with models of user interface and user experience features, and multiple testing approaches, including black-box and white-box methods.

8.6. Conclusion

The section concludes the project by presenting essential learnings and outcome results alongside future development plans. The section examines both how well gamification works for learning and the development obstacles and the required enhancements to achieve scalability. The article explores both advantages and constraints of the platform.

8.7. Evidence of Project Management

The section shows supervisor-approved meeting logs alongside signature collection to monitor the LearnIT project progress. The document includes an elaborate Gantt chart that tracks both project milestones together with daily task completion.

8.8. References and Bibliography

The last section of this report contains all references to research papers, along with articles and sources that were used in the document, and follows proper citation rules.

9. Literature Review

9.1. Background research and discussion

9.1.1. Introduction

Software development professionalism maintains standards for ethical and legal requirements and security standards, and provides efficient user experiences. A web-based educational platform named LearnIT depends on professionalism to preserve data security and fair grading while managing ethical content and making resources accessible to users through interactive learning features. User data security, quiz results, and learning progress security require LearnIT to follow data protection regulations to protect personal information while blocking unauthorized access to systems.

Cybersecurity and digital transactions in Nepal fall under the regulations of the Electronic Transactions Act, 2063 (2008), and the National Cybersecurity Policy 2078 (2022). The Electronic Transactions Act, 2063 (2008) grants legal protection to electronic records and digital signatures as well as secure online transactions to protect users against cybercrimes. Additional measures for ensuring digital security become necessary because this legislation makes hacking, identity theft, and digital fraud illegal. The National Cybersecurity Policy 2078 (2022) works to secure critical digital infrastructure and necessitates data encryption and proper user information storage practices. LearnIT can create a secure educational space and strengthen its user trust along with platform credibility through compliance with these legal shielding frameworks.

9.1.2. Aims

To provide a comprehensive review of the related literature on web-based educational platforms concerning the technology that underlies them, the teaching and learning

approaches that inform their design and implementation, and the effects of these platforms on users' learning motivation and achievement.

9.1.3. Objectives

- To investigate the impact of gamification in enhancing user motivation and participation.
- To study the effects of the lessons and quizzes on students' learning outcomes.
- To assess the efficacy of implementing adaptive learning mechanisms for enunciating a personalized approach to education.
- To evaluate the significance of UX design in learning applications.
- To focus on the issues of security and scalability in web-based systems and identify different problems and solutions for them.

9.2. Review of Related Papers

a. Tailored Gamification in Education
Source: (Oliveira, 2023)

Description: As discussed by (Oliveira, 2023) The article is concerned with the idea of introducing the concept of personalized gamification in the context of learning activities to increase the effectiveness of learning processes based on game design adapted to the characteristics of the learner. Hence, the research emphasizes the horizon of correlation of specific goals of gamification, which are psychological and behavioral traits of learning styles and preferences. Although the examples of tailored gamification reveal the potential to enhance Learner engagement and minimize frustration, the review has recognized methodological limitations, such as weak statistical evidence of learning outcomes and low time adaptability in many of the applications. To advance knowledge in this area, future research should be on dynamic modeling and/or comprehensive evaluations of the developed personalized gamified systems.

Evaluation: This also corresponds with the requirement of my project, as analysis of users' learning outcomes entails a process of creating interesting, effective, and individual-oriented tools and activities for the learning process, which will keep the learners motivated.

b. **Between Level Up and Game Over: Literature Review of Gamification in Education**
   Source: (Manzano-León, 2021)

   Description: Improving Motivational and Performance Issues: A Focus that (Manzano-León, 2021) Paid close is the effect of gamification on motivation levels and academic achievement. The adoption of point, badge, and leaderboard components in educational gamification empowers learners by providing voice, agency, and teamwork. The Self-Determination Theory (SDT) supports applying motivational gamification to increase the effectiveness of motivation, stressing the need for autonomy, competence, and relatedness. To this effect, the review emphasizes that the use of gamified techniques increases interest and curriculum-related competencies, especially in universities. Still, focusing on external rewards, as many of the design strategies do, may ultimately decrease motivation for completing activities, thus requiring equal reliance on intrinsic and extrinsic motivation.

   Evaluation: In the context of my project, finding the right mix of such elements will avoid overshadowing the educational objectives and keep users interested.

c. **Importance of User Privacy and Data Protection in Educational Mobile Apps**
   Source: (Crudu, 2024)

   Description: Education apps offer important functionality, yet these apps also gather significant amounts of information about the users, so security issues have to be addressed. According (Crudu, 2024), the latter systems describe the need to implement corporate

safeguards such as encryption and secure authentication procedures. This is so because in learning platforms, data, including learners' performance and other data, is likely to be stored there.

Evaluation: The above practices are very significant for my app since they must demonstrate compliance with data protection regulations to protect and secure the customers using my app.

d. **Impact of online learning on students' performance and engagement**
   Source: (Akpen, 2024)

   Description: Proper development of online learning platforms includes the provision of features that enhance the participation of learners. Real-time feedback, quizzes, and other types of interactive lessons enhance the users' participation and performance, as explained by (Akpen, 2024). They conclude that in the use of social media to achieve learner engagement, it was established that the more engaging or active the platform, the better positioned it was at ensuring that users stay and also get better results.

   Evaluation: This insight is useful to advance your app and where elements such as quizzes, progress bars, and instant feedback contribute much to interest.

9.3. Comparison to similar app and their progressive history

a. **Duolingo: Transforming Language Learning**
   Duolingo was started in 2011 by Luis von Ahn and Severin Hacker; the primary goal focuses on offering language learning to everyone for free. Initially, it unveiled Spanish and German courses, and very soon added more languages to its list. In 2015, it launched Duolingo for Schools, aimed at classrooms, and became a very useful resource for teachers. During this period, its structure with features such as streaks, badges, and leaderboards became rather popular compared to traditional learning approaches. In between, the company expanded its

horizon and elaborated separate courses for such languages as Welsh or Hawaiian, and accessible to everyone.

In its early years, Duolingo launched with Spanish and German courses, quickly expanding its offerings. By 2015, it introduced Duolingo for Schools, targeting classroom use and making it a valuable tool for educators. During this period, its gamified approach, featuring streaks, badges, and leaderboards, gained widespread popularity, setting it apart from traditional learning methods. Between 2016 and 2020, Duolingo broadened its scope, adding courses for lesser-known languages such as Welsh and Hawaiian. It also developed the Duolingo English test, giving learners an option from the normal tests like the TOEFL. The learning application had surpassed 300 million users by December 2020, making Duolingo the premier language learning app. More specifically, in 2021, the application entered the stock exchange with the indication that it was worth over $6 billion.

New features include the artificial intelligence-based elements; for instance, Duolingo Max, which provides enhanced conversational practice as well as enhanced feedback. By 2015, it introduced Duolingo for Schools, targeting classroom use and making it a valuable tool for educators. During this period, its gamified approach, featuring streaks, badges, and leaderboards, gained widespread popularity, setting it apart from traditional learning methods. (Vega, 2024)

b. **Mimo: From a Start Up to a Global Coding Hub**

Mimo, founded on September 9, 2016, by Johannes Berger, Dennis Daume, Heinrich Ameseder, and Lorenz Schimik, started with the goal of making coding accessible and enjoyable. First of all, it was aimed at providing basic courses on web development or programming languages such as Python and JavaScript. Mimo incorporated streaks, achievements, and breakdown lessons, and for such reasons, the use of gamification made coding far less daunting for the majority of users. In this period, Mimo decided to further develop the range of its courses up to the extent of making it cover more specialized forms, including data science and cybersecurity. And accessible for everyone.

From 2020 to 2023, Mimo also added new subjects to courses, such as data science and cybersecurity. It provided users with a working ground without the need to leave the app by incorporating a hands-on coding base. This growth was recognized when Google Play awarded Mimo among the Best Self-Improvement Apps. More recently, Mimo has integrated recommendations for learning based on Artificial Intelligence and also collaborates with companies to offer tutorials relevant to their sectors, this way makes it clear that it is a serious player in the market for coding education. (Anon., 2024)

c. **Sololearn: Building a Social Learning Ecosystem**
   Sololearn, a mobile-based platform offering programming courses, was co-founded in 2014 by Yeva Hyusyan and Davit Kocharyan in Armenia and aims at programming learning among learners and cooperation. First, it carved a niche for itself by creating a platform that would enable learners to solve some problems, ask questions, and interact with one another. Implementations such as quizzes, challenges, and integrations like a code playground were fun and kind of added a social feel.

   Over the last two years, from 2018 through 2020, the Sololearn app grew and added features such as certificates of completion and doubled the range of programming languages in the code playground. Originally launched in 2015, by 2020, it had over 20,000,000 users and had become one of the most influential platforms to learn coding with the help of a community. Over recent years, Sololearn has implemented suggestions regarding the progression that the app will recommend for the learner, as well as new features for learning in groups and implementing friendly competitions. The additional services provided on the platform include detailed analytics and the ability to use the product offline. This is packaged in the Sololearn Pro subscription model that is geared towards individual learners and professionals. (Anon., 2024)

9.4. Comparing Progress and Evolution

Today, all of them – Duolingo, Mimo, and Sololearn have been developed from startup companies to worldwide market leaders within the last decade. Duolingo revolutionized language learning through the incorporation of games and easy-to-use methods, and Mimo similarly revolutionized coding education through cube-based education. This way, the social aspect of learning, which Sololearn paid so much attention to, engineered a Social Learning Environment. These apps have continued to evolve, adding elements like learning that adapts, personalization through artificial intelligence, and the use of game aspects to captivate the user. This is even evident from their progress, where trends show how advancement in educational technology makes learning easier, fun, and effective all across the globe.

9.5. Challenges and Opportunities

i. Over-reliance:

The use of the model in designing the gamified systems may substantially rely on extrinsic motivation techniques such as points and badges. This may result in learners being busy with extrinsic motivation, not learning deeply and long-term term because the repetition does not bring interest as before (Manzano-León, 2021).

ii. Limited Personalization:

Though individualized gamification lends itself to procedural advantages, few initiatives allow for real-time flexibility to respond to learners' differences as necessary. In the current research, generalizable, unsupervised game-like systems are preferred to their highly individualized AI counterparts, limiting the effectiveness of gamified environments.

iii. Reduced Social Interaction:

Technology-supported learning delivery systems cannot provide the social learning experience as offered in physical classrooms. Such isolation can pose a problem to the learner's satisfaction or engagement. (Akpen, 2024).

iv. **Technological Disparities:**

Lack of equal access to effective internet and devices remains a problem that affects all, especially in areas of low economic development. This increases the digital divide, hampers the utilization of online learning platforms, and continues inequality in education. (Akpen, 2024).

v. **Methodological Limitations:**

Previous works on gamification and online learning often entail some minor issues, including limited sample size, restricted studies in the time dimension, and a lack of statistical analysis. Such gaps limit the external validity of research and restrict more extensive applications. (Oliveira, 2023).

9.6. Opportunities for future Development

i. **Real-Time Adaptive Systems:** Managing content to provide enhancements of learning experience feedback with virtual or augmented reality would need to incorporate the best of advanced AI and machine learning algorithms to feed personal data within the course to allow for learners' needs to be met through dynamic elements such as gamification. This would also increase the efficiency of using gamification and online learning systems in the classroom.

ii. **Blending Gamification with Social Learning**: Gamification might be integrated with other social technologies such as discussion forums, team competitions, and group assignments to reduce the potential of learners feeling that they are alone while studying online.

iii. **Enhancing Inclusivity:** Designing courses for offline learning and designing learning experiences that can run on low-end machines can be used to effectively narrow down the digital divide for students and allow more students to have as much access to quality education as possible.

iv. **Intrinsic Motivation Models:** Therefore, to enhance the learning outcomes lasting for a long period, it is possible to develop the kind of games where the reinforcing mechanisms focus on curiosity and mastery. Promising approaches in this regard are narrative-based incentives and motivational calls for meaningful work.

v. **Longitudinal and Large-Scale Studies:** Future primary research with greater numbers and periods of enrolment can also strengthen the findings related to the effectiveness of education through gamification and online learning environments. This would help to define further strategies by which these methods could be extended and refined.

vi. **Hybrid Learning Environments:** As with the strengths of both online and face-to-face instruction, incorporating virtual and educational play with practical movements is an integrated solution.

vii. **Sustainability and Scalability:** Introducing the use of cloud-based solutions and other scalable infrastructures will allow learning platforms to be effectively expanded to larger memberships by reducing demands on the platform and any potential detriment to the user experience.

10. Project Methodology

10.1. Scrum Methodology

This project development follows Scrum as its chosen subset within the Agile methodology. Scrum operates as a flexible change-based framework that helps teams achieve better results through cooperative work methods and continuous adjustment systems. Scrum has been chosen as the development methodology over Waterfall and DevOps, and Rapid Application Development (RAD) because it offers flexible adaptability with incremental working software releases through its sprint cycles. (Morandini, 2021)

Scrum consists of:

- **Sprints:** Sprints' strategy incorporates brief development periods extending from one week up to four weeks to perform targeted task completion.
- Product Backlog maintains a prioritized schedule containing planned features, enhancement work, and corrective measures for development.
- Sprint Planning includes a team conference that selects backlog items for work within the sprint.
- Daily meetings run for brief periods to maintain progress status and identify upcoming obstacles and moves.
- Sprint Review: A demonstration of completed work at the end of each sprint.
- During Sprint Retrospective the team conducts a review which helps identify achievements and requirements for enhancement during the upcoming sprint. (Morandini, 2021)

Using Scrum ensures that:

- The development process operates iteratively to allow continuous flexibility and numerous adjustments.
- Team members get consistent feedback from all users and stakeholders.
- Regular testing combined with repeated development cycles helps applications maintain their high-quality standards.
- The synergy improves between developers and testers as well and product owners.
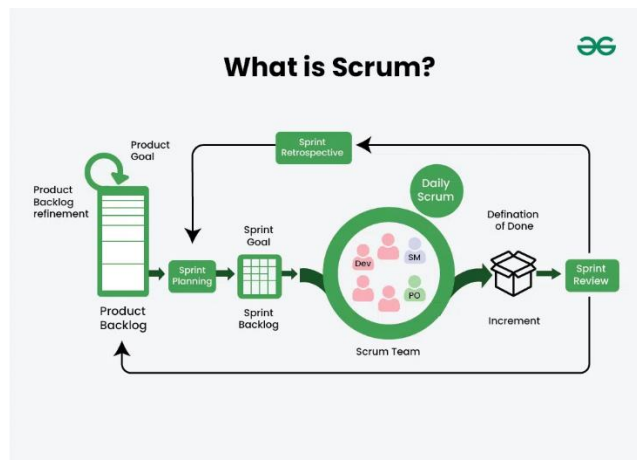
10.2. Adaptability and Flexibility

The application should be in a constant state of evolution, primarily because users will be shaping the tool's subsequent iterations based on their feedback, and new technologies may affect the app. Due to the iterative nature of Scrum, it is very easy to respond to changes in the requirements, feedback, or scope of a project. (Permana, 2015) Noted the flexibility of scrum to estimate that it affords the various teams the prompt opportunity to adapt to various changes, and hence recommend it where frequent change is needed, say, where the education app changes its user needs frequently.

10.3. User-Centered Development

The key factor of the success of app lies in the fact that there is a focus on its relevance to the needs of its users. Within Scrum, there is a focus on a Sprint Review where functional increments of the app are shown to stakeholders. This feedback frequency is in concordance with (Akpen, 2024) Proposal on how engagement and satisfaction can be increased, especially when the development loop includes user feedback. In the case of the educational app, it denotes the process of fine-tuning aspects like the lessons, modules, quizzes, or progress bar that enhances the results of the user's constant feedback.

10.4. Iterative and Incremental Progress

The arrangement of the project is done more flexibly by Scrum, which divides the project into smaller, easier chunks of work called sprints that should not exceed 2 weeks, and by the end of this sprint, it is possible to deliver a product increment. This makes it possible for functional enhancements such as the lesson content, quizzes, and tracking of the user's system to be enhanced continuously. (Monika Yadav, 2015) Have pointed out that Scrum's iterative structure increases the chances of identifying the problem, which, if

uncovered, will be resolved as the project's many components are important for an educational platform.

10.5. Collaboration and Communication

Scrum Framework involves iterative cycles, which can effectively help in identifying risks and issues early, hence enabling them to correct the entire project. According to (Permana, 2015), Scrum advocates the integration and testing processes to be run continuously in the development process to reach high quality. Attempting to solve such challenges during the Scrum process means that the development of the educational app won't get off track and avoid significant issues.

10.6. Repetitive Improvement and Risk Management

Scrum's Product Backlog creates a priority to guarantee that what needs to be developed comes first. That is why the decision-making of choosing high-priority tasks for each sprint helps the development team to continue delivering value from the very beginning of the project, wherein it's critical to have fully functional templates such as interactive lessons, quizzes, and progress tracking no later than at the beginning of the second sprint. This is in line with the objective of the project – the creation of an educational application that would offer the best return on investment for the target consumers.

10.7. Gantt Chart
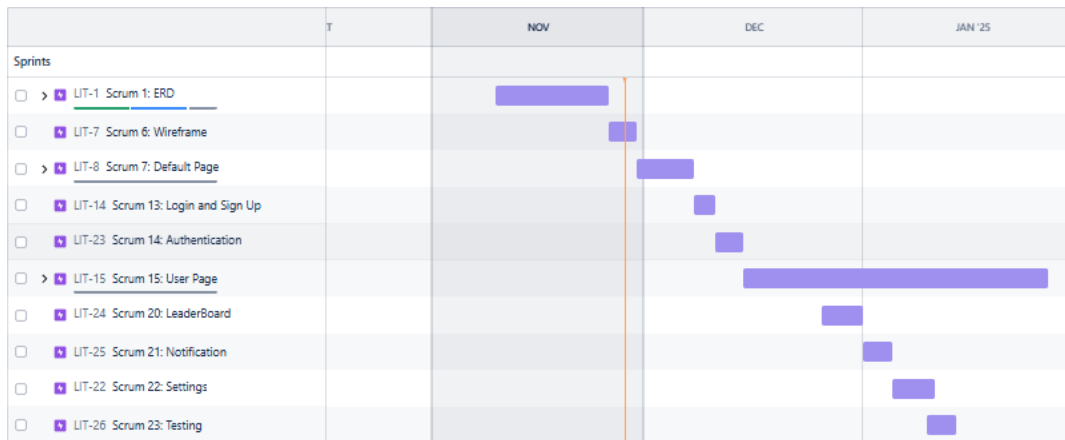
Figure 5: Gantt Chart

11. Technology and Tools

In my project, to attain the aforementioned goals while creating the web-based educational application, several tools and technologies have been chosen to support the project's goals and ensure a convenient, progressively incremental course of development. Here's a breakdown of the key tools and technologies used:

11.1. React.js (Frontend):

Why: React.js allows us to have a flexible, adaptive user interface that can engage with other back-end services. React's component-based approach allows one to use the elements within the framework repeatedly, making it easier to modify and improve as time passes. Moreover, using React, developers are provided with a wide array of solutions for effective and scalable development, including React Router for routing, Redux for state management, and a huge community of developers.

Use: React is used for the development of the interactive front end of the proposed educational app. The user interface (UI) of the lesson modules, quizzes, user progress, and dynamic content will use React.js.

11.2. Node.js and Express.js (Backend):

Why: It is based on the Chrome JavaScript runtime and is capable of processing backend requests much more efficiently while they are still asynchronous. Express.js is a tiny and highly adaptable Node.js web application framework that offers many important features for web and mobile application development. If you're creating a web application that has to be as scalable and as fast as possible while processing real-time data, then you surely need Node.js and Express.js as your backbone solution, which is rather important for the educational platform.

Use: Node.js will take on functions such as user session control, MySQL DB manipulation, and REST API servicing roles. Express.js will be used to set up the application routes, as well as to handle the server-side computations, including users' data, lessons' content, and results of the quizzes.

11.3. MySQL (Database):

Why: Django's built–in database, usually SQLite by default, but can be switched to PostgreSQL or MySQL, is a reliable and efficient RDBMS. Structured data is supported by SQL-based queries and seamlessly gets incorporated with Django's ORM (Object-Relational Mapping). It has been proven to be an efficient way of handling data, which makes it a great choice for a platform that uses data that needs to be retrieved and printed as an ordered list. Django database provides a process of ensuring the integrity, security, and scalability of the data and is best used for handling user profiles, storing lessons, quizzes for learning, and progress tracking.

Use: All user data, lesson completion status, quiz results, etc, are going to be stored using Django's built-in database. Django's ORM passes on both the ability to perform simple and complex queries efficiently, for example, recommending lessons to a user based on how their progress has evolved. It also has a built-in migration system in which you can make changes to the schema as the project evolves without any hassle and flexibility as per the future needs of enhancements.

11.4. Git and GitHub (Version Control):

Why Chosen: Git is a distributed version control application that can help developers manage code both in terms of version and cooperative changes. GitHub is used as the cloud storage platform of the project, and it provides strategic aspects such as branches, pull requests, and issues. Use in the Project: Git and GitHub will be used for version control throughout the development process. Everyone will share the project within their team, and GitHub will be used to track the changes to the code and also the history of the changes.

11.5. Visual Studio Code

The open-source Visual Studio Code platform can run on Linux and macOS, and Windows OS without any additional cost. The built-in debugger function of this platform enables efficient bug search and development time savings. Users can transform VS Code into a whole development environment through the integration of key extensions and by establishing shortcut keys and modifying system settings.

11.6. Figma

Users can obtain Figma without charge as a platform that enables wireframe and UI/UX design work for multiple projects. The tool possesses multiple design-enhancing plugins and has a responsive interface that enables direct graphic editing. Users can effectively collaborate with others through Figma since it provides both reading permissions and editing capabilities to its shared content.

11.7. Unit testing and Mock testing

The built-in unittest framework of Django provides backend testing, which verifies that models run appropriately together with views and APIs. The simulation of API responses and database interactions happens through unittest. Mock together with pytest-django during mock testing sessions. The testing process on the frontend consists of UI components and user interaction checks through Jest, along with React Testing Library to ensure product reliability.

11.8. Package Managers Used

Dependency and Django-related library management for the backend operates through either pip with virtualenv or pipenv. Frontend operations utilize NPM (it can also use Yarn) to control React dependencies and Webpack or Parcel handles the bundling process. The code quality and maintenance consistency of the project is supported by both ESLint and Prettier.

12. Artefact Design

12.1. SRS (Software Requirements Specification)

Legend

UMS – User Management System

CDS – Content Delivery System

GS – Gamification System

PTS – Progress Tracking System

QS – Quiz System

NS – Notifications System

Requirement Types:

F – Functional Requirement

NF – Non-Functional Requirement

U – Usability Requirement

12.2. User Management System (UMS)

Req. Code	Requirement Description	Use Case	Moscow Prioritization
UMS-F-1.0	The system allows the user to create a new account and log in.	User Login and Sign Up.	Must have
UMS-F-1.0.1	The system allows the user to log in or sign up through a social media account (Facebook, Instagram, or Google account).	User Login	Could have
UMS-NF-1.1	The sign-up form information should be filled in by the user and should be encrypted for security purposes.		Must have
UMS-UR1.2	For a strong password, the user must enter a password that is a combination of letters, numbers, and special characters.		Could have
UMS-F-2.0	The user should assist the user in resetting the password in case the user forgets their password.	Reset Password	Should have
UMS-F-2.0	After the password has been changed successfully, an alert message should be displayed.	Alert notification	Should have
UMS-F-3.0	After logging in, the user should be able to view the home page and lessons.	View lessons	Must have

Table 1: UMS

12.3. High-Level Diagram
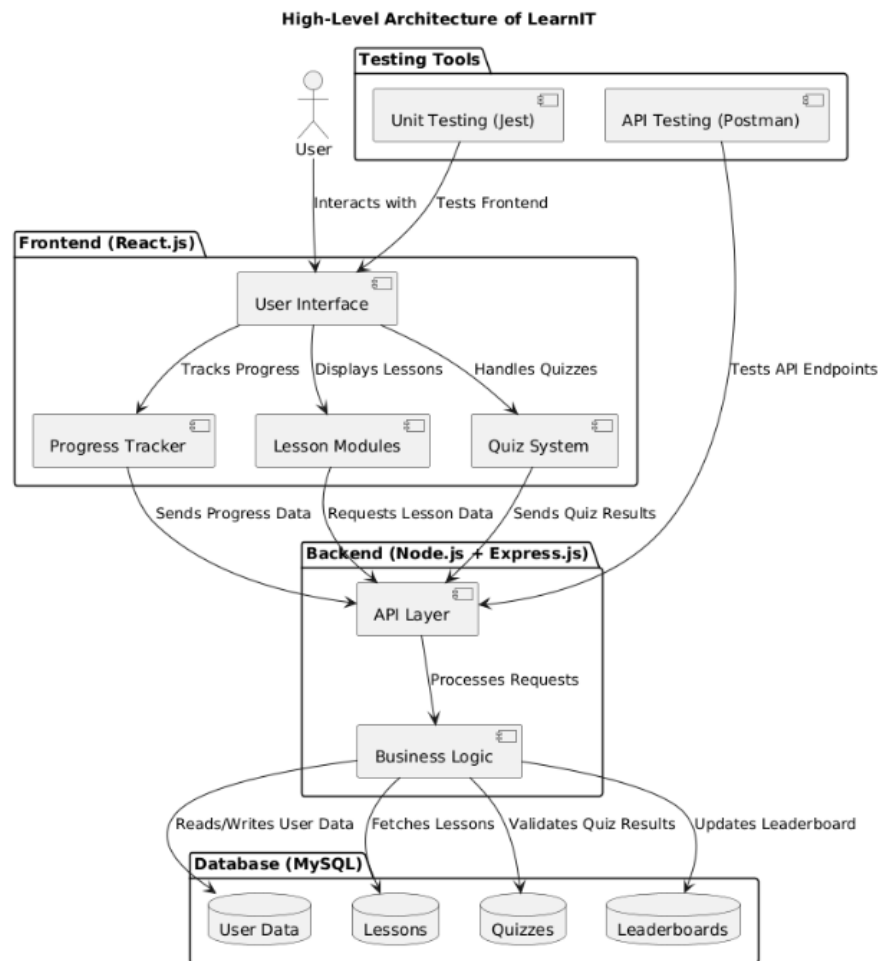
Figure 6: Architecture Diagram

12.4. Low-Level Diagram Use Case Diagram:

i. Use- case diagram

Use case of LearnIT
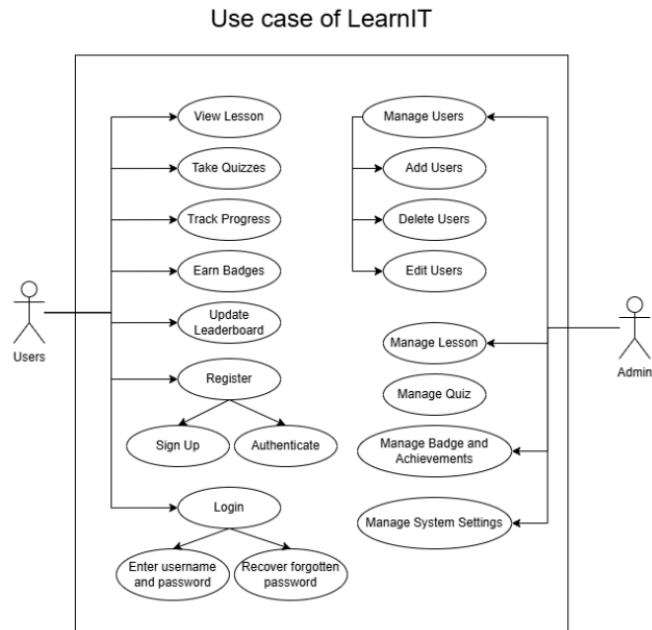
Figure 7: Use-case Diagram

ii.   Activity Diagram:

Activity Diagram of User Management System (UMS)
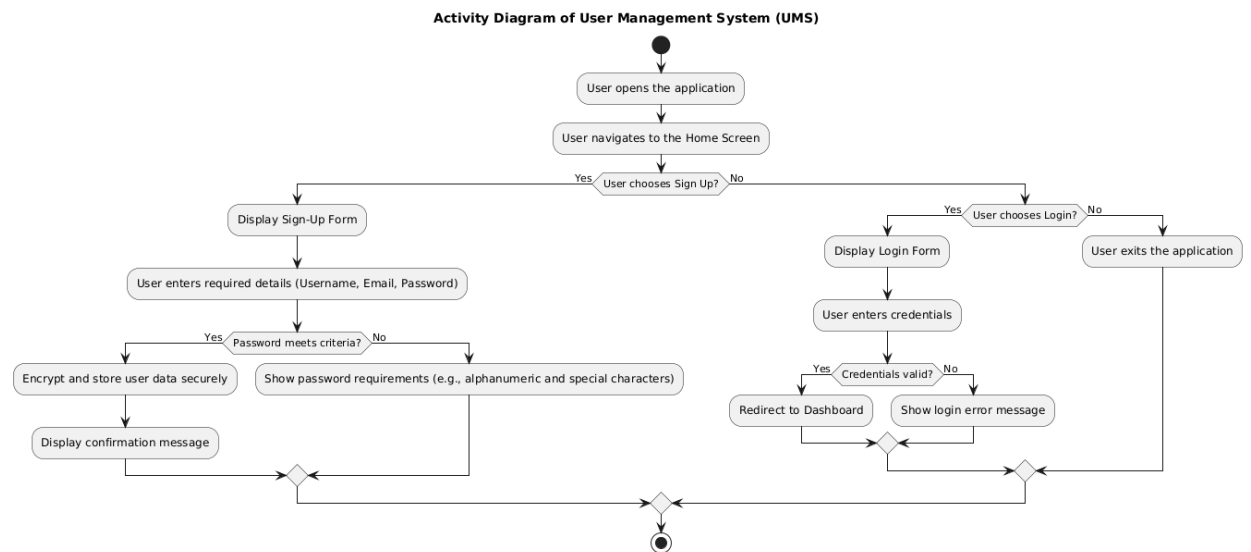
Figure 8: Activity Diagram

Activity Diagram for Forgot Password Process

- User opens the application
- User navigates to the Login screen
- User clicks "Forgot Password"
- Display Forgot Password Form
- User enters their registered email address
- Validate email address
- Email is valid?
  - Yes: Send password reset link to the provided email
  - No: Show "Invalid email address" error message
- User receives email and clicks the reset link
- Display Reset Password Form
- User enters a new password
- Password meets criteria?
  - Yes: Encrypt and store the new password securely → Display password reset confirmation
  - No: Show password requirements (e.g., alphanumeric and special characters) → Prompt user to enter a new password again

Figure 9: UMS: Forgot Password Activity

iii. Sequential Diagram:
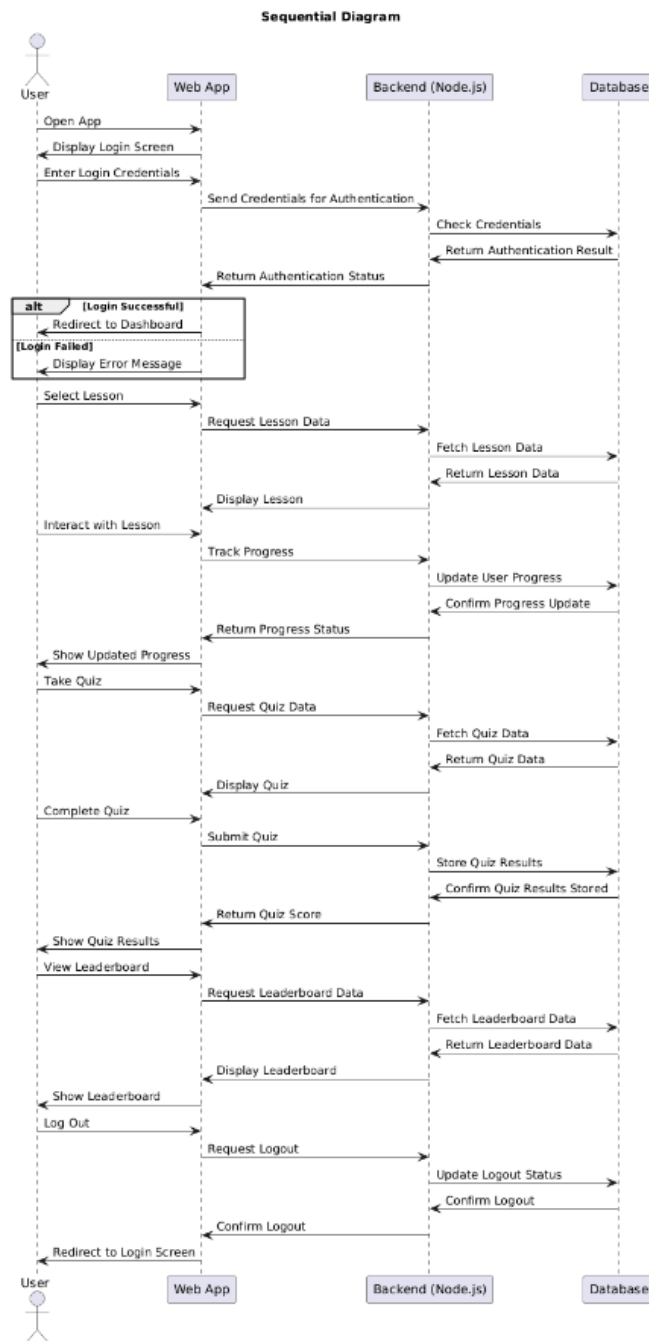
Figure 10: Sequential Diagram

12.5. Content Delivery System (CDS)

Req. Code	Requirement Description	Use Case	Moscow Prioritization
UMS-F-1.0	The system allows the user to create a new account and log in.	User Login and Sign Up.	Must have
UMS-F-1.0.1	The system allows the user to log in or sign up through a social media account (Facebook, Instagram, or Google account).	User Login	Could have
UMS-NF-1.1	The sign-up form information should be filled in by the user and should be encrypted for security purposes.		Must have
UMS-UR1.2	For a strong password, the user must enter a password that is a combination of letters, numbers, and special characters.		Could have
UMS-F-2.0	The user should assist the user in resetting the password in case the user forgets their password.	Reset Password	Should have
UMS-F-2.0	After the password has been changed successfully, an alert message should be displayed.	Alert notification	Should have
UMS-F-3.0	After logging in, the user should be able to view the home page and lessons.	View lessons	Must have

Table 2: CDS

12.5.1. Diagram

1. Activity Diagram
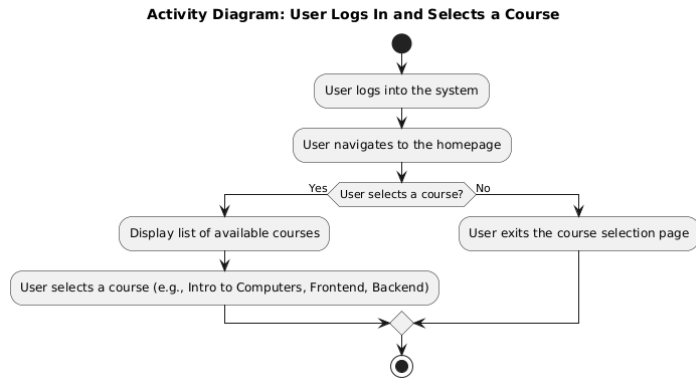
Figure 11: Activity Diagram (CDS)

2. Sequential Diagram
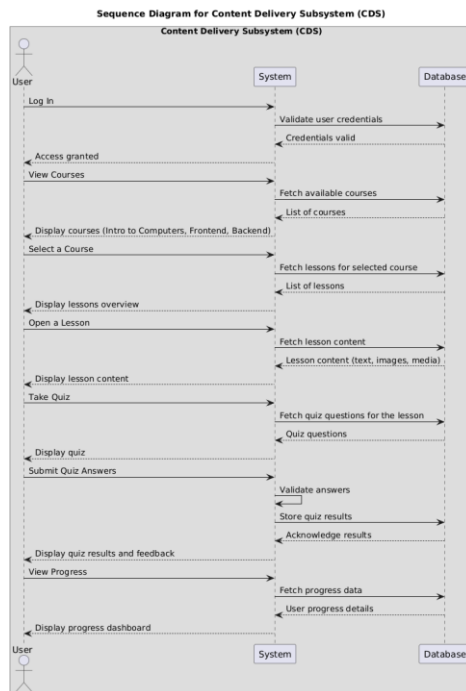
Figure 12: CDS Sequential

3. Use Case Diagram
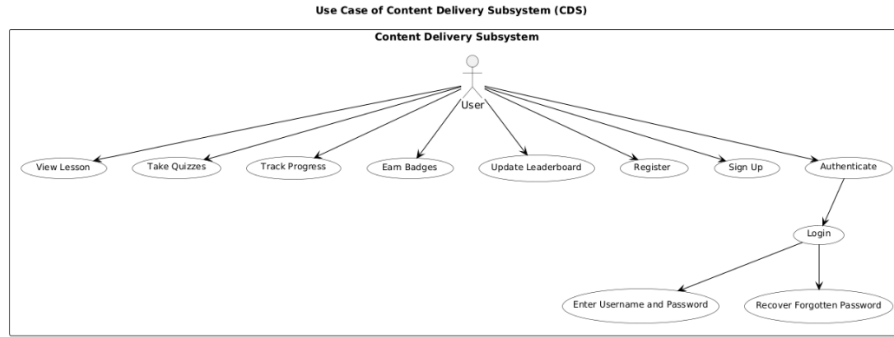
Figure 13: CDS Use-Case

12.6. Quiz System

Req. Code	Requirement Description	Use Case	Moscow Prioritization
QS-F-1.0	The system allows users to give quizzes after lessons to test understanding.	Take Quizzes	Must have
QS-F-1.1	The system provides real-time feedback on quiz answers to help the user improve their understanding and learn from mistakes.	Real-Time Feedbacks	Must have
QS-F-1.2	Users can retake the failed quiz to correct their mistakes and improve more.	Retake Failed Quiz	Must have

Table 3: QS

12.6.1. Diagram

1. Activity Diagram
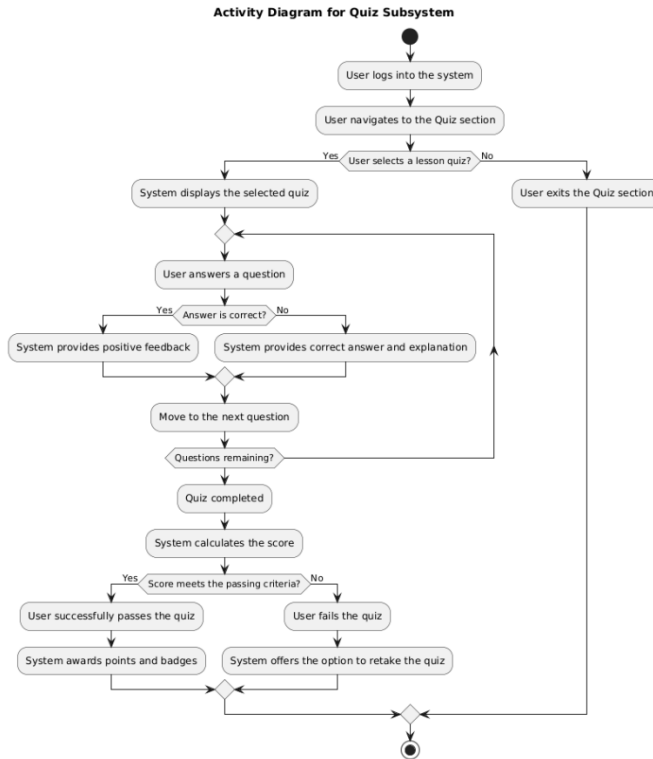
Figure 14: QS Activity

2. Sequential Diagram
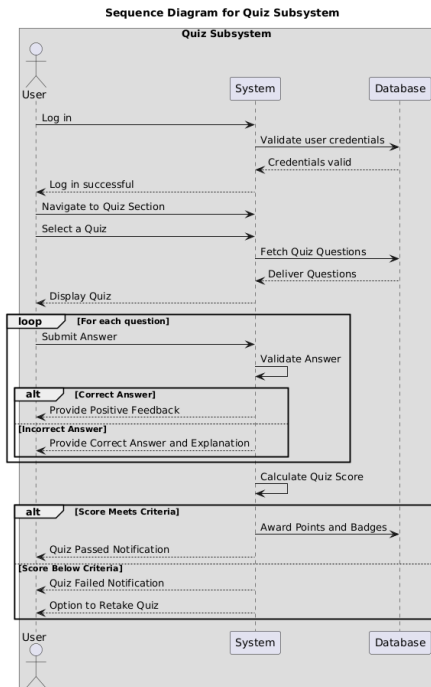
Figure 15: QS Sequential

3. Use Case Diagram
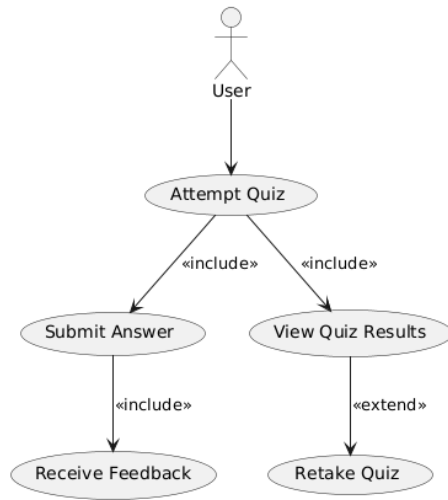
Figure 16: QS Use-Case

12.7. Progress Tracking System

Req. Code	Requirement Description	Use Case	Moscow Prioritization
PTS-F-1.0	The system allows the user to track their progress in the dashboard. As the user completes a lesson a tick mark appears.	Track Progress	Must have
PTS-F-1.1	The system generates reports showing completed lessons and quiz results.	Generate Progress Reports	Should have

Table 4: PTS

12.7.1. Diagram

1.   Activity Diagram
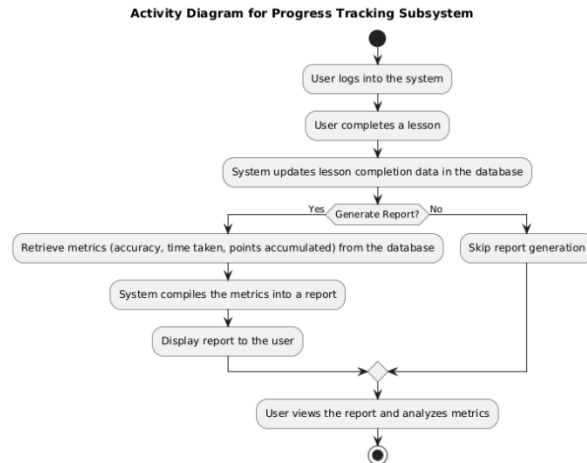
Figure 17: PTS Activity

2. Sequential Diagram
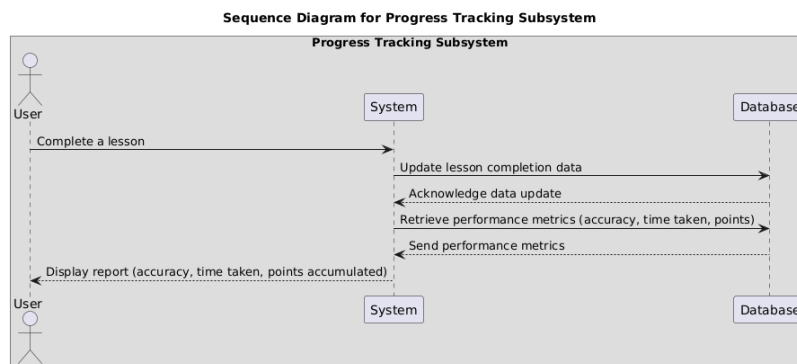
Figure 18: PTS Sequential

3. Use Case Diagram
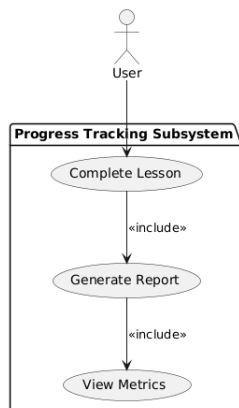
Figure 19: PTR Use-Case

12.8. Gamification System (GS)

Req. Code	Requirement Description	Use Case	Moscow Prioritization
GS-F-1.0	The system gives the user badges and points when they complete the lessons.	Award Badges and Points	Must have
GS-F-1.1	The system allows the users to view a leaderboard to track their ranking and motivate them through competition.	Personalize Lessons	Should have

Table 5: GS

12.8.1. Diagram

1. Activity Diagram

Activity Diagram for Gamification Subsystem with Leveling Up

- User completes a lesson or quiz
- System calculates points earned based on performance
- System updates accumulated points in the database
- Points exceed badge threshold? — Yes → Upgrade user to new badge level; No → Skip badge upgrade
- Display badge upgrade notification to the user
- System updates leaderboard with new points
- Display updated leaderboard to the user
- User views their rank, accumulated points, and badge level

Figure 20: GS Activity

2. Sequential Diagram

Sequence Diagram for Gamification system
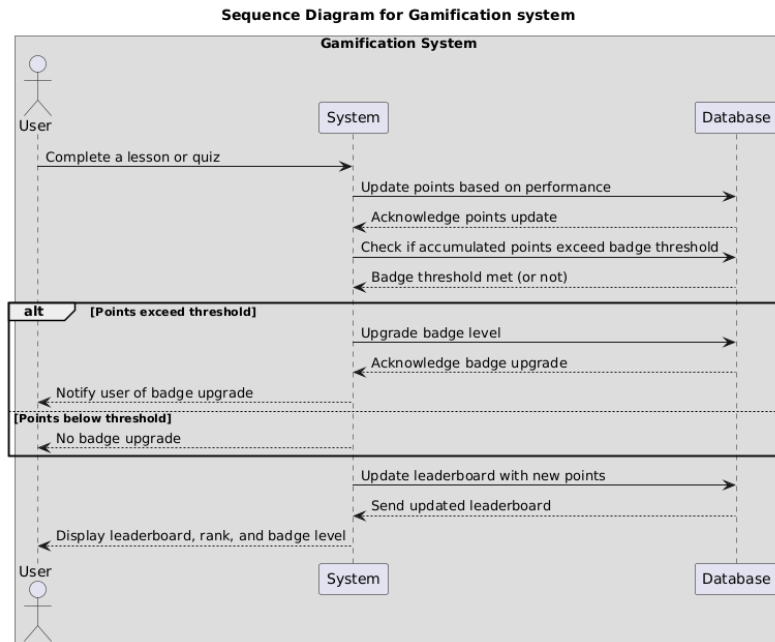
Figure 21: GS Sequential

3. Use Case Diagram

Use Case Diagram for Gamification Subsystem
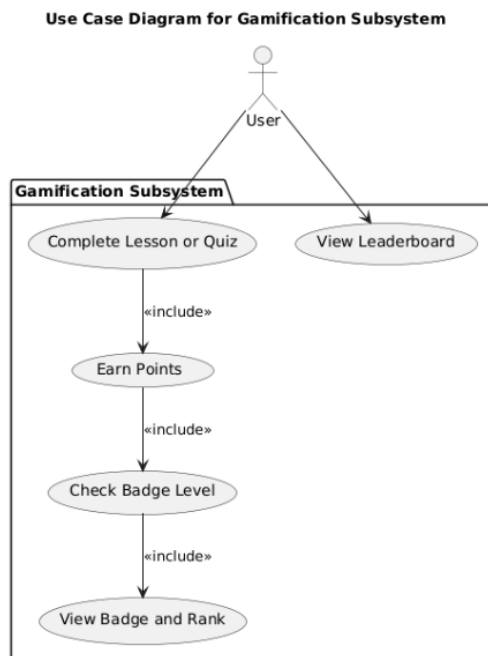
Figure 22: GS Use-Case

12.9. Notification System (NS)

Req. Code	Requirement Description	Use Case	Moscow Prioritization
NS-F-1.0	The system sends notifications to the user about the new lessons or pending quizzes to stay engaged.	Notifications	Must have

Table 6: NS

12.9.1. Diagram

1. Activity Diagram
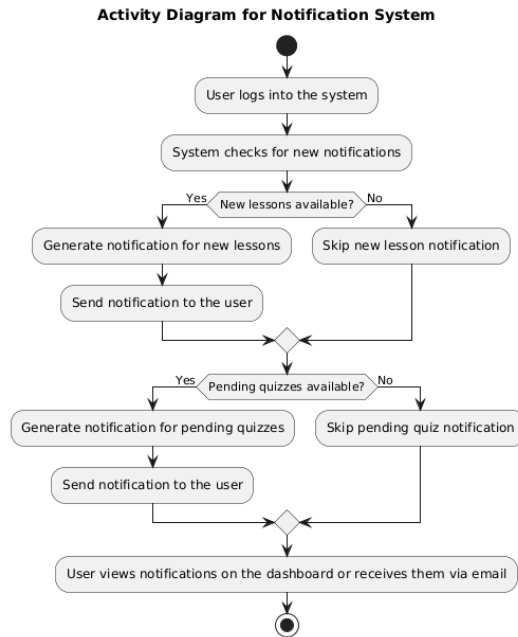
Figure 23: NS Activity

2. Sequential Diagram
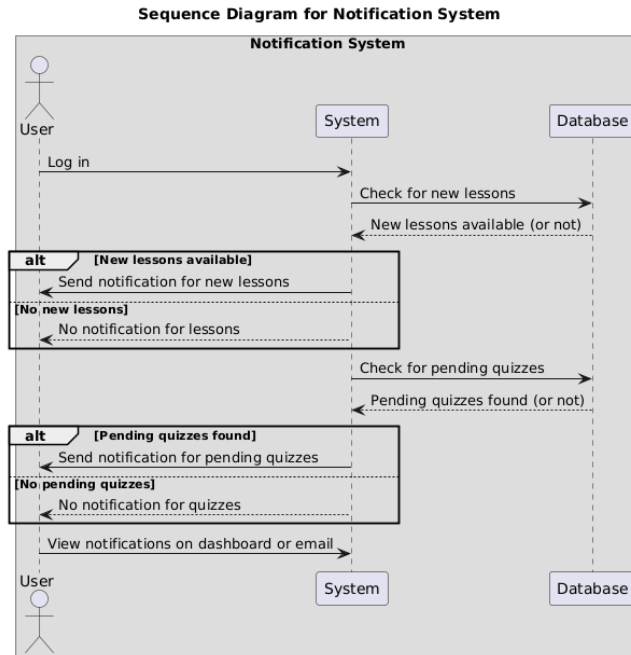
Figure 24: Sequential NS

3. Use Case Diagram
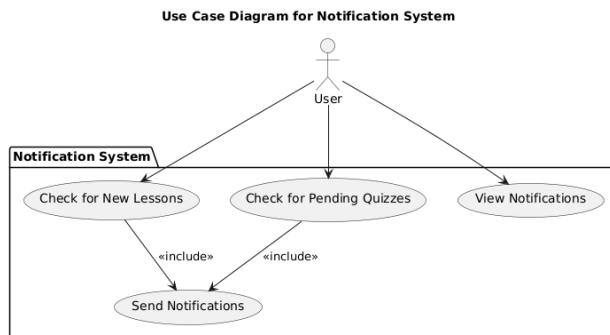
Figure 25: Use Diagram NS

13. Testing

A. Black Box Testing

The testing methodology does not reveal the system's logical structure or code design information to testers. During testing activities, testers evaluate the application inputs and outputs as they neglect to explore its underlying process. (Myers, 2020)

B. White Box Testing

The tester gains complete access to understand internal system design elements when following this testing approach. During testing the internal program operations and logical code structure are checked for verification. (I., 2003)

TC_ID	Requirement ID	Keywords	Priority	Testcase Title	Description	Precondition	Steps	Test Data	Actual Result	Remark/Suggestion
TC_001	Req_001	Functionality	Must be	Admin Login	Admin should be able to log in to the admin dashboard.	Admin login page should not be visible to users; admin must have valid credentials.	1. Navigate to /admin in the URL. 2. Enter admin username and password. 3. Click on Log In.	Username: admin Password: anita1234	Successfully logged in and redirected to the dashboard.	Fulfilled
TC_002	Req_002	Functionality	Must be	User Sign-Up	Users should be able to register for an account.	The signup page should be accessible, and users must provide valid information.	1. Navigate to the signup page. 2. Fill in required fields (username, email, password). 3. Click Sign Up.	Email: ram1234@gmail.com Username: ram Password: ram12345	Successfully registered the user account.	Fulfilled
TC_003	Req_003	Functionality	Must be	User Login	Users should be able to log in to their accounts.	Users should have a valid account and be on the login page.	1. Navigate to the login page. 2. Enter valid username and password. 3. Click Log In.	Username: ram Password: ram12345	Successfully logged in and redirected to the homepage.	Fulfilled
TC_004	Req_004	Functionality	Must be	User Logout	Users should be able to log out after logging in.	Users must be logged in to access the logout option.	1. Click on the Logout button in the user profile. 2. Confirm the logout prompt if available.	N/A	Successfully logged out and redirected to the login page.	Fulfilled

Figure 26: Test case for LearnIT

14. Wireframe

Link:
https://www.figma.com/design/rAvGxRU4zXgAZ1utATdpjW/LearnIT?t=gYbnhp0t6Y5tHmaF-1

Pictures:

Figure 27: SignUp

*Figure 28: Profile*

Figure 29: Quiz Page

Figure 30: Quest Page

Figure 31: Landing Page
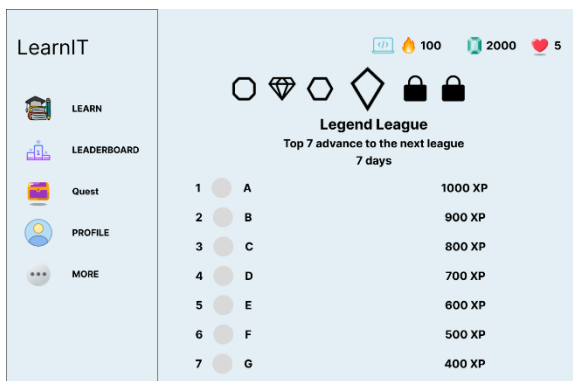
Figure 32: Leaderboard
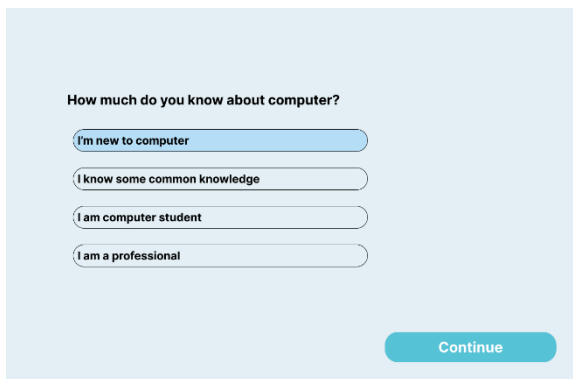

Figure 33: Knowledge Enquiry Page
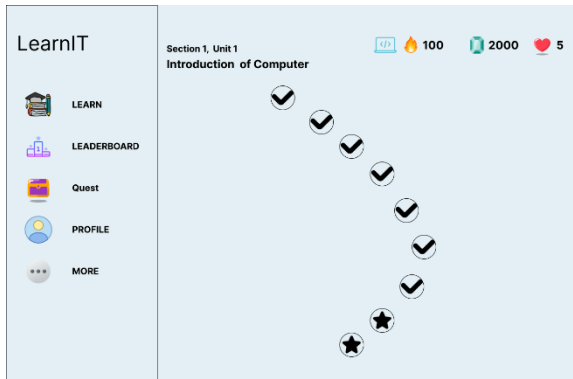
Figure 34: Home Page
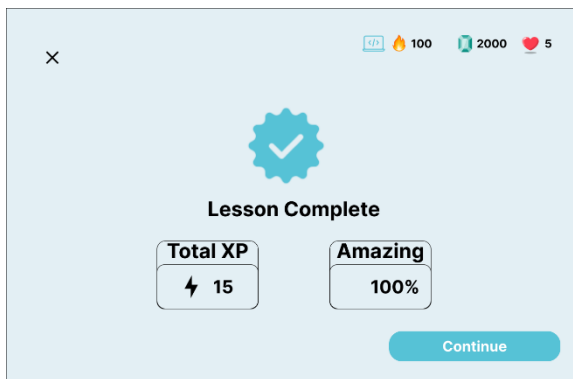

Figure 35: Progress
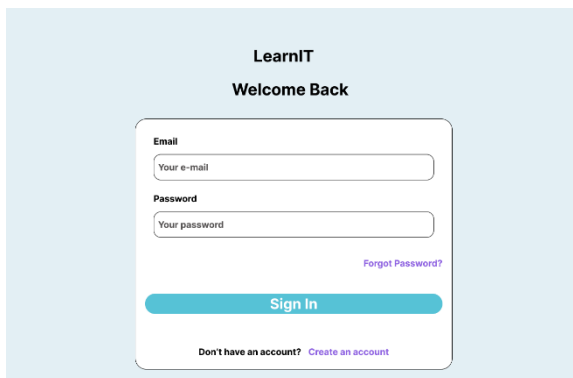
Figure 36: Login

15. Professional, Ethical, Legal, and Social Issues (PELSI)

15.1. Ethical Issues

The digital transformation emphasizes the importance of ethical problems that arise from educational software development. Although an action might not break any law, it can represent immoral behaviour that offends community norms. The unauthorized handling of user data stands as a primary ethical issue because software platforms extract personal information from users without their consent. The unethical collection of user data results in both privacy violations and damages to digital learning trustworthiness (Priscilla M. Regan, 2018). The data collection framework of LearnIT must establish open privacy policies that enable users to manage their profile information while implementing complete openness standards.

LearnIT must adhere to data protection laws when it handles user progress information along with quiz outcomes and personal details through secure storage systems that maintain restricted system access for responsible data management. The Electronic Transactions Act, 2063 of 2008, along with the National Cybersecurity Policy, 2078 of 2022, set the legal framework for data privacy and cybersecurity and responsible digital content use in Nepal. (Diana Florea, 2020). Users face privacy risks when LearnIT neglects to follow data protection rules, so the solution needs strong encryption standards along with protected login systems and controlled permission systems to stop unauthorized information access and leaks.

Learning software security lapses have resulted in unintentional data leakage, thus requiring LearnIT to establish strict security protocols. Educational platform security breaches are primarily caused by vulnerable authentication systems, which combine with weak encryption methods to attract cyber threats. (Mark Klose, 2020) The LearnIT development team needs to face ethical obligations to actively protect users by implementing standard industry security measures such as complete encryption and continuous security assessment alongside GDPR conformity.

15.1.1. Case Study 1

Through gamification principles, Duolingo changed educational practices by enabling experience points (XP) together with leaderboard streaks and badges. The programmed rewards found in these features drive students to participate more actively because they receive positive feedback through a system of rewards. A gamified learning environment enables better student participation since it produces two effects: learners experience a sense of achievement and develop competitive behaviors. The gamification of digital learning provides both autonomy and immediate feedback to learners, as described by (Amin, 2021). Through its interactive features, Duolingo develops solid learning patterns that produce improved long-term language proficiency.

The educational use of gamification delivers positive outcomes, but students encounter multiple difficulties when using this approach. Learners respond positively to rewards along with streaks, but this engagement system may divert their attention from conceptual learning toward finishing tasks. The motivation for students centers on keeping their streaks active instead of dedicating effort to complete material comprehension. The system of gamification functions alongside teacher-led instruction because certain learners need teacher guidance to master advanced language structures. According to (Amin, 2021) Students develop superficial learning patterns from extreme gamification because they prioritize reward completions over adequate mastery of the material. A single combination of gamification elements must be defined correctly because it needs to support meaningful learning experiences that both motivate learners and develop deep cognitive engagement.

15.1.2. Case Study 2

Khan Academy represents a well-known interactive learning system that stands apart from regular lecture-based education because it employs adaptive quizzes together with real-time tracking mechanisms and customized lesson sequences. Research demonstrates that learning methods with instant feedback and active recall engagement

produce better student knowledge retention, along with improved participant engagement. The interactive features of Khan Academy enable student engagement and understanding by supporting learners who advance at different paces through content specific to their abilities. (Sheikh, 2021) The research evidence demonstrates that students have better retention when given immediate feedback together with interactive exercises, which ultimately produces better academic results.

Interactive learning sets boundaries for student learning capabilities. Rockledge School Online offers limited opportunities for direct student-instructor interactions because digital learning platforms do not provide the same level of immediate teacher-student interaction that exists in conventional classroom settings. Motivating students to work independently becomes challenging when they lack self-discipline, which prevents them from following self-guided lessons. (Sheikh, 2021) Found that interactive learning platforms might not support all types of learning through their research, since student requirements for direct communication with teachers remain insufficient. Educational platforms achieve their maximum effect when they provide community-based features, peer discussion elements, and teacher-assigned guidance to create interactive consequences with directed learning assistance.

The research analyzes how active learning methods should combine with teaching methods to create LearnIT systems that build memorable educational experiences for students.

15.1.3. Possibilities of Ethical Issues in LearnIT

During operation, LearnIT generates an interactive platform for collaboration, but various ethical issues emerge as users participate in activities. The improper sharing of academic content exists as a possible ethical concern. Shared academic content may be stolen or plagiarized in discussion sessions and collaborative work assignments, leading to improper recognition of original creators. Users take part in unacceptable dialogue that involves harsh attacks aimed at teachers or classmates, thus creating an unfavourable academic environment.

Online consumers' personal privacy information represents another ethical matter. Users can expose their classmates to identity disclosure incidents without notifying those students about their privacy compromise. The learning experience becomes disrupted when users share either intentionally or unintentionally sensitive or inappropriate content through the platform. Additional ethical violations within the LearnIT community include gossiping about instructors and improper quoting or misquotations, followed by non-attribution and leaks of forum discussions. The platform must implement thorough moderation standards, together with clear ethical frameworks combined with a secure complaint system to protect users from risks by creating a respectful digital learning space.

15.1.4. The Legal Implications

LearnIT encounters legal consequences because employees fail to abide by both laws and regulations during their actions. Flouting data protection and copyright laws together with Cybersecurity rules in educational technology leads to legal action and enforcement and negative impacts on reputation. LearnIT must secure ethical and legal standards through complete adherence to intellectual property legislation, together with user data protection standards and fair usage requirements. LearnIT remains at risk for legal exposure stemming from unauthorized copyrighted content usage, along with improper data handling breaches, because Nepal's Electronic Transactions Act 2063 (2008) and 2078 (2022) National Cybersecurity Policy and GDPR and CCPA international frameworks have established laws and regulations.

The main issue for LearnIT involves copyright infringement, given that educational content, together with quizzes and course materials, is shared without authorized permission. The inability to protect user information puts the platform at risk of violating statutory privacy and security regulations. Several users, alongside developers, remain involved in unethical conduct despite their knowledge about potential legal consequences that cause unpredictable financial and legal reversals. LearnIT can protect against legal challenges by adopting strict compliance, together with detailed policies, conducting regular audits, and using transparent user agreements to shield the platform from potential risks as well as its users.

A) Copyright Issues

Copyright Compliance in LearnIT Reproduction of intellectual property, along with unauthorized distribution, represents a violation of copyright laws, which results in both legal penalties and security risks. The intellectual property of Nepal rests on the Copyright Act (2002), together with Copyright Rules (2004), to protect content and fight against infringement. The proper attribution and licensing of educational resources becomes vital for LearnIT because it consists of text and multimedia content alongside images, as it violates copyright laws. The platform stays compliant by using materials from open-license repositories, together with necessary permissions, while providing proper references for all third-party content. The platform demands that all content creators, both educators and users of LearnIT, properly attribute original authors while only using assets with Creative Commons licenses and royalty-free permissions when these options are available. By implementing strict copyright compliance policies, LearnIT aims to validate ethical standards, protect intellectual property, and conserve legal integrity while delivering high-quality educational content. (Albnian, 2025) (Dahal, 2024)

B) General Data Protection Regulation (GDPR)

Users under the General Data Protection Regulation (GDPR) achieve control of their data through this privacy framework, which helps organizations maintain safe and proper data handling. The educational software LearnIT, together with other contemporary digital platforms, gathers user data, including names, email addresses, and learning progress details; therefore, GDPR compliance protects users from data breaches and unwanted exploitation (Regulation, 2018). LearnIT gives its users the option to choose their preferred username, which enables them to stay anonymous if they wish to do so. LearnIT does not require users to share personal identifiers like full names or phone numbers along with its password encryption functionality, which protects user passwords from every administrator on the system. Users must provide a

legitimate email address because it enables security password resets while keeping their personal information protected. LearnIT follows GDPR principles by having a system where administrator actions to delete user accounts result in complete data removal from their servers. (Regulation, 2018).

15.2. Security Aspects

Every LearnIT implementation includes state-of-the-art security protocols that defend user data consisting of passwords, personal information, and email authentication credentials. Educational platforms need to establish powerful authentication features, together with encryption methods and access permission systems, because cyber threats remain active, so data breaches, along with unauthorized access, require prevention. The implementation of poor security measures leads to user data breaches and identity crime, as well as privacy breaches, so backend systems must utilize strengthened access controls and proper authentication processes. (Korać, 2021). Active security audits, multi-factor authentication adoption, and execution of optimal Cybersecurity measures are essential due to vulnerabilities in authorizations, encryption strength, and security configuration at LearnIT.

15.2.1. Password Hashing

LearnIT, built on Django, implements the PBKDF2 algorithm with SHA256 hash encryption to ensure secure storage of passwords since the method represents an extremely secure encryption standard. The passwords for users and admins exist only in hashed and salted format, securely stored to give protection against database breaches. User passwords remain hidden from view during the admin dashboard usage because it is accessible only to administrators, and because administrators do not have access to view passwords. This approach ensures tight data protection and security standards. LearnIT implements the security measures of Django architecture to defend user credentials from cyber threats like brute-force attacks and credential leaks, thus demonstrating its dedication to protecting user privacy and data security. (Anon., 2025)

15.2.2. Reset Password

Users within LearnIT can easily reset their passwords through a secure system that enables them to regain access to their accounts when they forget their passwords. The direct reset of passwords from the login page serves LearnIT users who need to change their passwords because prolonged password reuse enhances cybersecurity risks. The built-in authentication system of Django provides users with a secure password reset functionality, which requires this sequence of actions: Users must access their account using the email address that they originally used for registration. The system shows a notification that an email containing password reset information has been sent to the user.

i.   Users need to inspect their email inbox for the received password reset link. Users should select the link that is sent via email to initiate the password reset process.

ii.   Users must enter a new password twice for confirmation and then use the reset password button.

iii.   The password reset process concludes successfully with the appearance of a verification message.

iv.   Users can access their account by using the new password they enter at the login page after the redirection. (Innocenti, 2021)

15.2.3. Authorized User

The system implements a rigorous user authorization process for maintaining the security of the platform while controlling proper access permissions. The system enables access to particular functional areas only for authorized users. Through the admin dashboard, admins can view and control the platform features and course material contents as well as track system user activities. The system design allows both students and teachers to interact with course materials and quizzes as well as discussion forums. The system demands a login process because LearnIT functions as a secure private platform for educational activities that protect the security of student-teacher communications. The

introduction of role-based access control (RBAC) protects learning platform security because it prevents unauthorized personnel from accessing administrator tools.

15.2.4. Logout

Users of LearnIT can log out at any moment to boost their account security. Users are subjected to security threats when they neglect to log out from shared devices because it grants unauthorized parties access to their accounts for potential misuse. Users can execute a secure logout within LearnIT to keep unauthorized parties away from their personal learning content and quiz answers as well as their messages.

16. Conclusion

The developers of LearnIT created a system that improves remote education through the use of interactive tests, which combine progress reports and video game-inspired instructional formats. The main goal was to build a user-friendly educational system that delivered fair evaluation together with responsible content management practices across secure data protection frameworks. Judging from the system's development successes, we confirm that the project's main objectives were achieved their objectives through its organized interactive structure that provides users with progress monitoring tools and adaptive quiz functionality, and feedback inclusion. The system meets both the Electronic Transactions Act 2063 (2008) and the National Cybersecurity Policy 2078 (2022) to secure private data according to Nepal's local data privacy standards.

The LearnIT platform exists to bring digital learning options closer to the forms of education experienced in traditional classrooms. The platform is intended to establish an effective learning system that would keep students interested while helping students who have experienced difficulties with traditional teaching methods. Through gamification mechanisms, including rewards and progress tracking, the system has managed to stimulate user participation by motivating them better. Through development activities, we have proven that personalized learning methods need technology implementation in contemporary education practices. The AI-driven recommendation system, along with structured content in LearnIT, forms an educational environment that acknowledges different student learning approaches.

16.1. Key Discoveries and Conclusions

The creation of LearnIT produced significant results that surfaced during development. User feedback along with research findings proved that adding gamification features, particularly points and rewards, and leaderboards, enhances student motivation and learning engagement. Learning retention improves when students receive these interactive features because they remain dedicated to their academic development and finish assigned tasks. Data Privacy and Security Compliance took center stage since educational platforms were collecting and storing user data, thus requiring LearnIT to integrate robust security features.

The project followed the provisions of Nepal's Electronic Transactions Act of 2063 (2008) that establishes legislation for digital transactions, together with user data security protocols. The security policy known as National Cybersecurity Policy 2078 (2022) of Nepal provided guidelines for creating secure authentication systems and implementing encrypted storage, along with establishing ethical data usage rules. In contemporary education, a universal learning model fails to serve student needs effectively. LearnIT uses

personal assessment quizzes that modify their complexity according to user achievement levels. Thanks to these features, learners receive training material specifically designed to enhance their learning potential according to their particular skill level. Insightful reviews through interactive feedback tools represent a key advantage of LearnIT because the system delivers real-time quiz results directly to students who need to reflect on mistakes with improved comprehension. Users improve their knowledge retention through this feature because they can follow their progress over time.

LearnIT establishes accessibility features by creating an intuitive user interface with language customization options, together with a responsive system. The system includes features that allow users with disabilities to easily benefit from it, along with other system users. The dynamic learning setting created by LearnIT joins modern instructional methods together with high-tech system capabilities. The platform blends protective measures for educational standards with ethical requirements while meeting user expectations to become a significant e-learning instrument.

16.2. Self-reflection

This report delivers an elaborate explication regarding the development process of LearnIT including research activities and deployment practices. The report demonstrates project achievements against major challenges through an organized direction for future development improvements. The literature review establishes the requirement for gamified learning which is combined with a systematic Agile development methodology. The system's technical deployment receives comprehensive documentation which focuses on protecting data and developing usable interfaces as well as managing information. The team incorporated ethical procedures to maintain data security and obligation to privacy regulations. User needs faced opposition during the process although the project demonstrated good technical capabilities. Subsequent platform releases should focus on bettering AI-based individual customization elements and multimedia content integration to boost user engagement.

16.3. Findings and development process finding

Through gamification schoolchildren experience enhanced motivation and better results in their learning process. System monitoring and instant response evaluation enables students to reach better results. A crucial necessity exists for educational platforms to meet standards of data security while maintaining ethical management of data. Learning programs that individualize educational routes deliver better results than conventional educational content.

Development Process: The development followed agile methodology to make sure incremental improvements took place. The system development process received essential feedback from users who guided the creation of specific functionalities. The system protected personal data through encrypted user authentication procedures as part of its security measures.

16.4. System Performance and Features

Strengths:

- Intuitive UI/UX for a seamless user experience.
- Secure authentication and user data encryption.
- System performance included dynamic quizzes with features that let users track their own progress.
- Compliance with data protection regulations.

Limitations and Areas for Improvement:

- The ability of adaptive learning to work with AI algorithms requires additional improvements.
- The present system design does not include offline learning capabilities even though it would be a valuable addition.
- The upcoming software update should include more multimedia elements like videos and simulations for better student involvement.

16.5. Implementation of planning, managing, and quality of sources

The success of the project required excellent project management techniques to ensure consistent development. The use of: The project used Gantt charts which established precise assignments for each task. Agile working through sprints permitted teammates to collect ongoing feedback while optimizing operations at each step. The research paper along with content from the sources of Springer and IEEE Xplore and MDPI offered solid theoretical evidence.

16.6. Self-reflection and Professional Growth

My work on LearnIT development delivered multiple benefits which strengthened my technical competencies and professional capabilities. The project required expertise in:

- The backend development function of Django executes database management tasks with robust security capabilities.
- A dynamic front-end experience requires the implementation of frontend user interfaces through the utilization of React technology.
- UI/UX Design: Ensuring an intuitive interface for diverse users.
- Security and Compliance: Aligning with Nepalese cybersecurity and data protection laws.

The project taught necessary lessons about these important attributes beyond coding knowledge:

- Ethical considerations in software development.
- Data privacy and responsible data handling.
- The design process starts by putting users first to develop interactive educational materials.

The completion of this project accelerated my career advancement so I am now ready to undertake work in software engineering along with web development and educational technology functions. The work has expanded my comprehension of educational breakthroughs enabled by technology which delivers education to all learners in a dynamic manner worldwide.

Future Prospects: LearnIT has potential growth points that include the implementation of future features such as:

- AI-driven recommendations for personalized learning.
- Integration of AR/VR for immersive learning experiences.
- Mobile app development for enhanced accessibility.

This study successfully produced important findings about e-learning and digital education technologies of the

17. Evidence of Project Management

17.1. Log Sheet

Figure 37: Log sheet 1

Figure 38: Log sheet 2

Figure 39: Log sheet 3

Figure 40: : Log sheet 4

Figure 41: Log sheet 5

Figure 42: Log sheet 6

Figure 43: Log sheet 7

Figure 44: Log sheet 8

Figure 45: Log sheet 9

Figure 46: : Log sheet 10

Figure 47: Log sheet 11


Figure 48: Log sheet 12

Figure 49: Log sheet 13

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