STUDENT LEARNING REWARD SYSTEM

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ABSTRAK

Pelajar yang belajar di universiti luar negara sukar untuk menyesuaikan diri dengan budaya dan sistem pembelajaran tempatan. Satu kajian mendapati bahawa pelajar antarabangsa menghadapi cabaran untuk menunjukkan pembelajaran mereka secara berkesan dengan cara yang sejajar dengan piawaian asing, yang berbeza daripada amalan dan konvensyen pendidikan yang biasa mereka lakukan di negara asal mereka. Dapatan kajian lepas menunjukkan sistem ganjaran yang berkesan dan adil adalah baik untuk motivasi diri, pembelajaran koperatif dan perpaduan sosial. Penyelidikan telah menunjukkan bahawa pembelajaran koperatif dan aktiviti berkumpulan akan meningkatkan pencapaian akademik, pemikiran kritis dan kemahiran peribadi pelajar. Kajian ini bertujuan untuk membantu pelajar mendapat keyakinan daripada ganjaran dan membantu mereka maju dalam pembelajaran dengan membangunkan sistem ganjaran pembelajaran pelajar. Tinjauan awal telah dijalankan untuk mendapatkan keperluan bagi Sistem Ganjaran Pembelajaran Pelajar (SLRS) yang dicadangkan. Metodologi tangkas telah diterima pakai untuk memudahkan pembangunan berulang dan menampung maklum balas yang berterusan. Sistem ini dibina menggunakan seni bina Model-View-Controller (MVC). Vue.js 2 telah digunakan untuk pembangunan bahagian hadapan, manakala logik bahagian belakang dilaksanakan menggunakan Spring Boot. MySQL telah dipilih sebagai pangkalan data hubungan, dan pangkalan data sistem dihos pada *Alibaba Cloud* untuk memastikan kebolehskalaan, kebolehcapaian dan keselamatan pengehosan. Sistem SLRS terdiri daripada tiga kategori pengguna iaitu pelajar, guru dan pentadbir. Pelajar akan mendapat mata ganjaran daripada menghadiri kelas, menghantar tugasan, mengambil kuiz/peperiksaan dan sebagainya. Tiga orang pelajar dan dua orang guru diminta membantu dalam ujian fungsian dan penerimaan pengguna untuk memastikan fungsi memenuhi keperluan pengguna dan sistem. Ujian kebolehgunaan telah dijalankan melalui tinjauan dalam talian dan 16 maklum balas telah diterima. Keputusan menunjukkan bahawa kesemua responden (100%) telah menggunakan fungsi daftar masuk kehadiran dan penyertaan kuiz, diikuti oleh 81.3% yang memuat naik tugasan dan 75% yang menggunakan antara muka log masuk/daftar. Separuh (50%) pengguna meneroka modul penebusan ganjaran, manakala 43.8% telah berinteraksi dengan sistem bahagian belakang guru/pentadbir. Ini menunjukkan tahap interaksi yang luas merentas modul sistem. Mengenai daya tarikan visual dan navigasi, 87.6% pengguna memberikan penarafan 4 atau 5, menunjukkan bahawa majoriti mendapati antara muka menarik secara visual dan mudah dinavigasi. Begitu juga, 87.5% mendapati mesej ralat seperti "Kod tidak sah" atau "Penyerahan gagal" membantu dan jelas. Penemuan ini mengesahkan bahawa antara muka pengguna memberikan maklum balas yang berkesan dan mesra

pengguna. Apabila menilai sistem ganjaran, 93.8% responden berasa bermotivasi untuk menyelesaikan lebih banyak tugas disebabkan oleh pengumpulan mata dan mekanik penebusan ganjaran. Penemuan ini memberi pandangan positif terhadap integrasi elemen ganjaran dalam sistem pembelajaran pelajar. Ganjaran akan menjadikan pengalaman pembelajaran lebih menarik dan akan menggalakkan pelajar mengambil bahagian dalam pembelajaran aktif.

ABSTRACT

Students studying in foreign universities find it difficult to adjust to the local culture and learning system. A study found that international students face the challenge of effectively demonstrating their learning in ways that align with foreign standards, which differ from the educational practices and conventions they are accustomed to in their home countries. Findings from previous studies showed that effective and fair reward systems are good for self-motivation, cooperative learning and social cohesion. Research has shown that cooperative learning and group activities will improve students' academic achievement, critical thinking, and personal skills. This study aims to help students gain confidence from rewards and help them advance in learning by developing a student learning reward system. A preliminary survey was conducted to acquire requirements for the proposed Students Learning Reward System (SLRS). Agile methodology was adopted to facilitate iterative development and accommodate continuous feedback. The system was built using the Model-View-Controller (MVC) architecture. Vue.js 2 was employed for front-end development, while the back-end logic was implemented using Spring Boot. MySQL was selected as the relational database, and the system database was deployed to Alibaba Cloud to ensure scalability, accessibility, and secure hosting. The SLRS system will have three categories of users namely students, teachers and administrators. Students will gain reward points from attending classes, submitting assignments, taking quizzes/exams and so on. Three students and two teachers were asked to help in system testing to ensure the functionalities fulfill user and system requirements. Usability testing was carried out via online survey and 16 responses were received. Results showed that all respondents (100%) had used the attendance sign-in and quiz participation functions, followed by 81.3% who uploaded assignments and 75% who used the login/register interface. Half (50%) of the users explored the reward redemption module, while 43.8% had interacted with the teacher/admin backend. This indicates a wide level of interaction across the system’s modules. Regarding visual appeal and navigation, 87.6% of users gave a rating of 4 or 5, showing that the majority found the interface visually attractive and easy to navigate. Similarly, 87.5% found the error messages such as “Invalid code” or “Submission failed” to be helpful and clear. These findings confirm that the user interface provides effective feedback and is user-friendly. When evaluating the reward system, 93.8% of respondents felt motivated to complete more tasks due to the point accumulation and redemption mechanics. These findings give positive insights on integrating rewards in student learning system. Rewards will make learning experiences more attractive and will encourage students to participate in active learning.

0 INTRODUCTION

Students studying in foreign universities find it difficult to adjust to the local culture and learning system. A study found that international students face the challenge of effectively demonstrating their learning in ways that align with foreign standards, which differ from the educational practices and conventions they are accustomed to in their home countries (Seno-Alday and Budde-Sung 2022). Reward systems are good for self-motivation, cooperative learning and social cohesion (Sham 2021). Research has shown that cooperative learning and group activities will improve students' academic achievement, critical thinking, and personal skills (Loes 2022). Loes (2022) also found that rewards will make learning experiences more attractive and will help students get knowledge better. Some universities use points to enable students to bid for elective course registration (Sönmez and Ünver 2010, Juthamanee, Piromsopa, and Chongstitvatana 2021, Norleyza et al. 2021). The rewards collected from students' learning activities can be used for elective course bidding. Some students have raised the issue of fairness in elective course bidding. This study plans to use the points collected from the Student Learning Reward System for course bidding. This system allows students to collect points from learning activities such as attendance, assignment submissions, quiz scores, participation in forum discussions, and many more. An algorithm for calculating weighted scores will be developed based on these activities. This weighted score method is expected to be fairer than based on CGPA points. This will motivate students to be more involved in active learning. The proposed reward system aims to solve the problem of unfair treatment among university students. It will have several functions such as scanning attendance via QR code, submitting assignments and quizzes, etc. Hence, there have to be several databases to store that information. Teachers can check the student attendance list generated from scanning and assignment submitting. It will allow lecturers to check students' learning progress and also will allow them to give feedback on students'

homework. The Student Learning Reward System will act as a platform between the school and students and between lecturers and students. It will provide a balanced relationship between students, schools and teachers (Aldiab et al. 2019).

2.0 LITERATURE REVIEW

Students who are studying in foreign universities find it difficult to adjust to the local culture and learning system. A study found that international students face the challenge of effectively demonstrating their learning in ways that align with foreign standards, which differ from the educational practices and conventions they are accustomed to in their home countries (Seno-Alday and Budde-Sung 2022). Reward systems are good for self-motivation, cooperative learning and social cohesion (Sham 2021). Research has shown that cooperative learning and group activities will improve students' academic achievement, critical thinking, and personal skills (Loes 2022). Loes (2022) also found that rewards will make learning experiences more attractive and will help students get knowledge better. Some universities use points to enable students to bid for elective course registration (Sönmez and Ünver 2010, Juthamanee, Piromsopa, and Chongstitvatana 2021, Norleyza et al. 2021). The rewards collected from students' learning activities can be used for elective course bidding. Some students have raised the issue of fairness in elective course bidding. This study plans to use the points collected from the Student Learning Reward System for course bidding. This system allows students to collect points from learning activities such as attendance, assignment submissions, quiz scores, participation in forum discussions, and many more. An algorithm for calculating weighted scores will be developed based on these activities. This weighted score method is expected to be fairer than based on CGPA points. This will motivate students to be more involved in active learning. The proposed reward system aims to solve the problem of unfair treatment among university students. It will have several functions such as scanning attendance via QR code, submitting assignments and quizzes, etc. Hence, there have to be several

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3.0 METHODOLOGY

This project adopts a structured, iterative development approach to design and implement a web-based student learning reward system. The goal of this system is to enhance student motivation through a gamified platform that allows students to collect points for academic activities and redeem them for various rewards. The system also supports administrative users (e.g., teachers) in managing tasks, exams, and reward allocations.

3.1 Needs Analysis

In modern educational settings, maintaining student motivation and consistent participation has become a significant challenge. Traditional learning environments often rely solely on academic assessments to evaluate students, which may not effectively reflect or encourage day-to-day engagement. Many students attend classes passively and lack incentives to actively participate in activities such as completing assignments, attending lessons punctually, or engaging in continuous assessments.

Moreover, most existing systems used by educational institutions focus on either attendance tracking or assessment recording without offering students any immediate rewards or motivation. There is a clear gap in providing real-time feedback and positive reinforcement that can help promote better academic behavior and self-driven learning.

To address this issue, the proposed system introduces a web-based Student Learning Reward System that incentivizes students through a point-based mechanism. Students earn points by participating in activities such as class attendance, completing quizzes, and achieving high scores. These points can then be redeemed for tangible or virtual rewards within the system. The platform also provides teachers and administrators with dashboards to monitor student performance and engagement.

3.2 Conceptual Model Design

The conceptual model of the Learning Reward System (LRS) is designed to ensure both secure data access and smooth system functionality through a multi-layered firewall structure. The architecture emphasizes controlled access to the backend SQL databases (DB1, DB2) hosted on Azure, as illustrated in Figure 1.

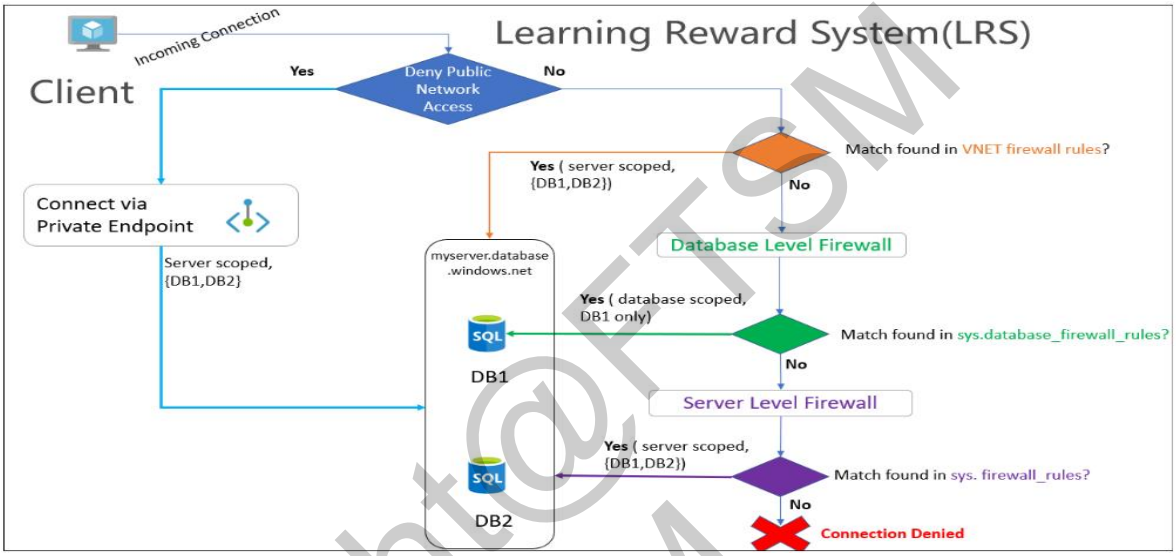


Figure 1 LRS model system

The model initiates from the Client, which attempts to establish a connection with the system. The system first determines whether public network access is allowed. If the public network is denied, the client must connect via a Private Endpoint, which is scoped at the server level and grants access to both databases securely.

If public access is permitted, the system checks whether the client's IP matches any Virtual Network (VNET) firewall rules. If a match is found, the connection proceeds directly to the server. If not, the connection must pass through a Database-Level Firewall, which only allows access if the IP matches specific database-scoped rules for DB1 (as shown by the green path). Otherwise, the request is evaluated by the Server-Level Firewall, which checks for a broader set of IP rules across both DB1 and DB2.

If no match is found at any level, the connection is ultimately denied, as indicated by the red "Connection Denied" path.

4.0 RESULTS

4.1 Interface Design

The Dashboard is the default homepage shared by all user roles, including Admins, Teachers, and Students. It provides a centralized overview of the system's key functionalities and serves as an entry point to various modules. At the top of the dashboard, there is a banner section that can display promotional images or announcements, enhancing visual engagement. Below the banner, a welcome card outlines the main features of the system, such as examination management, homework management, attendance tracking, point redemption, and system log monitoring. This helps users quickly understand the capabilities of the platform. Additionally, a reminder at the bottom encourages users to navigate through the functional modules using the left-hand sidebar menu. This unified dashboard design improves usability and ensures that all users start from a consistent and informative interface. Figure 2 shows the SLRS main dashboard.

Figure 2 SLRS Dashboard

1. Admin

In the Admin user interface, the system provides a Users Management module that allows administrators to manage all registered user accounts. The interface displays a table containing essential user information, including Username, Password, Role (e.g., Student, Teacher, Admin), Age, and Email.

Each user record includes Edit and Delete options under the Action column, enabling the admin to update user details or remove accounts as needed. The interface also supports pagination, which facilitates easy browsing when the number of users is large.

On the left sidebar, the admin can quickly navigate between different modules such as Users, Prizes, and Logs, ensuring efficient access to administrative functionalities. This layout

ensures user data is managed effectively, supporting system security and operational integrity. Figure 3 shows the admin's user management screen.

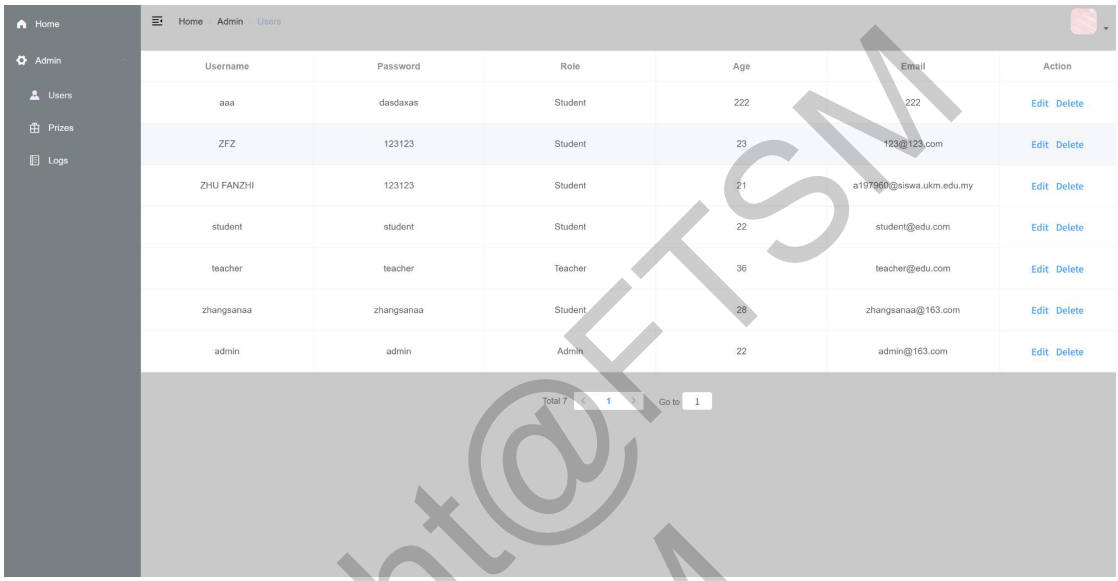


Figure 3 SLRS Users management for admin

In addition to user management, the Admin user interface includes two more critical modules: Prize Management and System Logs.

The Prize Management module enables administrators to manage all reward items available in the system. Each prize entry displays the Prize Name, Exchange Score, Stock, and Prize Description, along with Edit and Delete buttons for management. Admins can add new prizes using the Add Prize button and search for existing ones via a search bar by name. This module ensures that reward inventory is updated and controlled efficiently to support the student incentive system. Figure 4 shows the prize management screen..

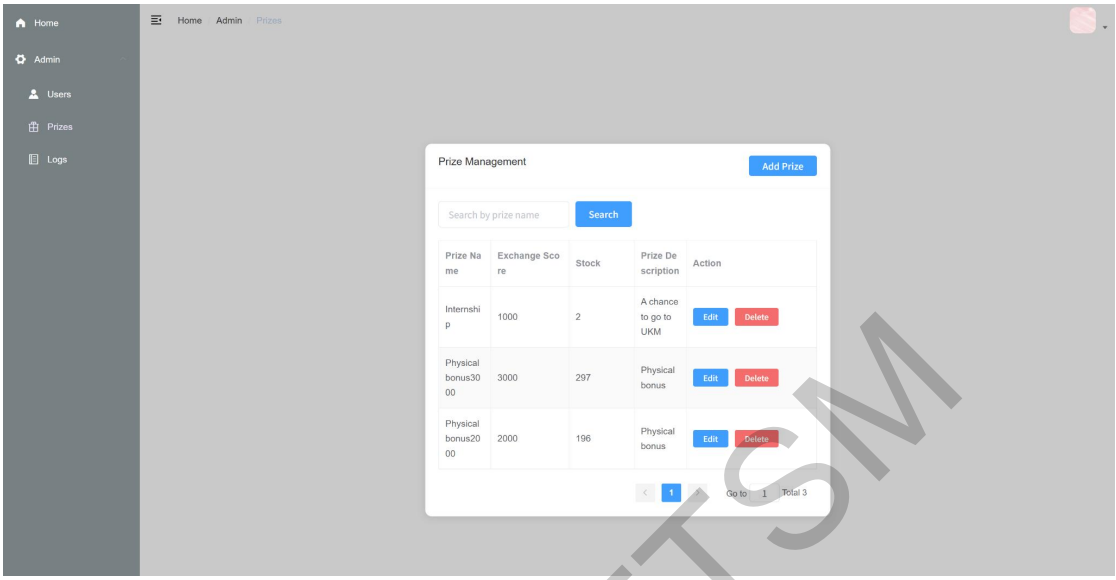


Figure 4 SLRS Prizes management for admin

The System Logs module provides a detailed record of all key system actions for auditing and monitoring purposes. The table includes ID, Action Type, Action Content, and Timestamp, enabling administrators to trace activities such as user logins, prize queries, and data access attempts. The pagination function at the bottom helps manage a large volume of log records efficiently, and a Refresh button allows for real-time updates. This logging system enhances transparency and security in system operations. Figure 5 shows the logs management screen.

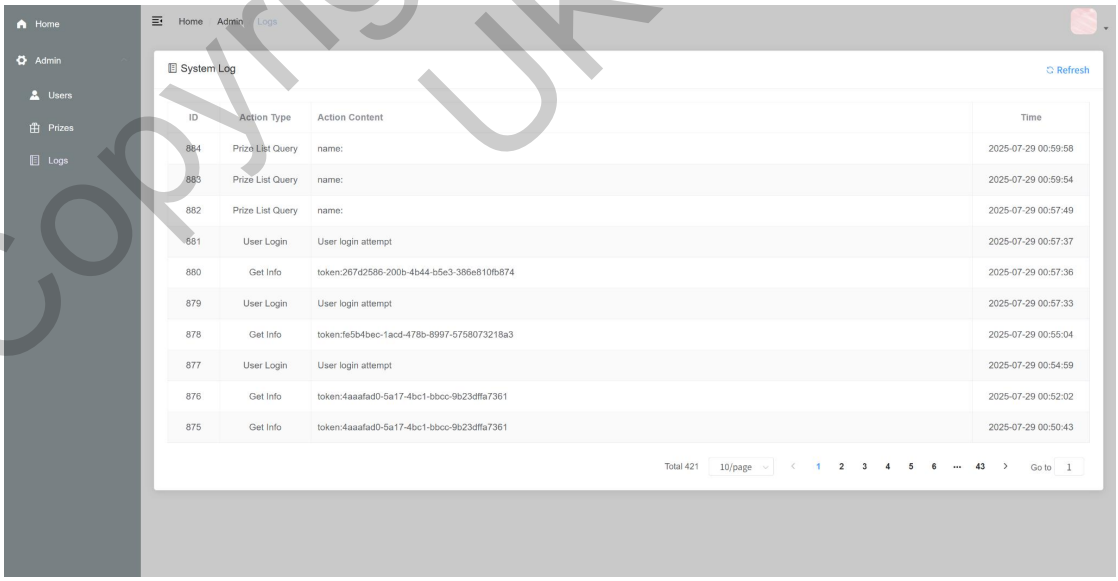


Figure 5 SLRS Logs management for admin

2. Teacher

The Sign-in List page allows teachers to manage student attendance records for their classes. Each entry in the list contains the course name, a custom remark, the start and end time for the sign-in session, and the class code. Teachers can delete a sign-in record if necessary or click

the “View Sign-In Members” button to see which students have signed in for a specific session. This functionality enables precise control and monitoring of classroom participation, which is essential for maintaining student engagement and accountability. Figure 6 shows the sign-in list for teacher’s review..

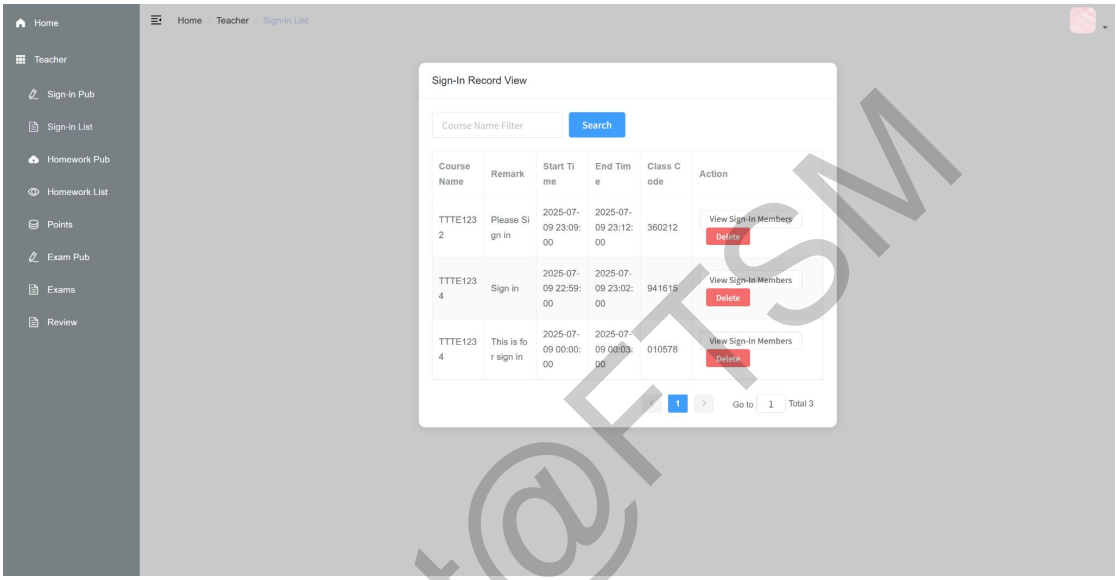


Figure 6 SLRS Sign-in list review for teacher

The Homework List page provides teachers with a clear overview of all the homework assignments they have published. Each row in the table displays the homework title, a short description, the publish time, the submission deadline, and a unique homework code. This page ensures that teachers can efficiently keep track of their assignments, verify deadlines, and make adjustments as needed. It helps maintain a structured learning environment by enabling transparent management of homework tasks. Figure 7 shows the students’ homework list.

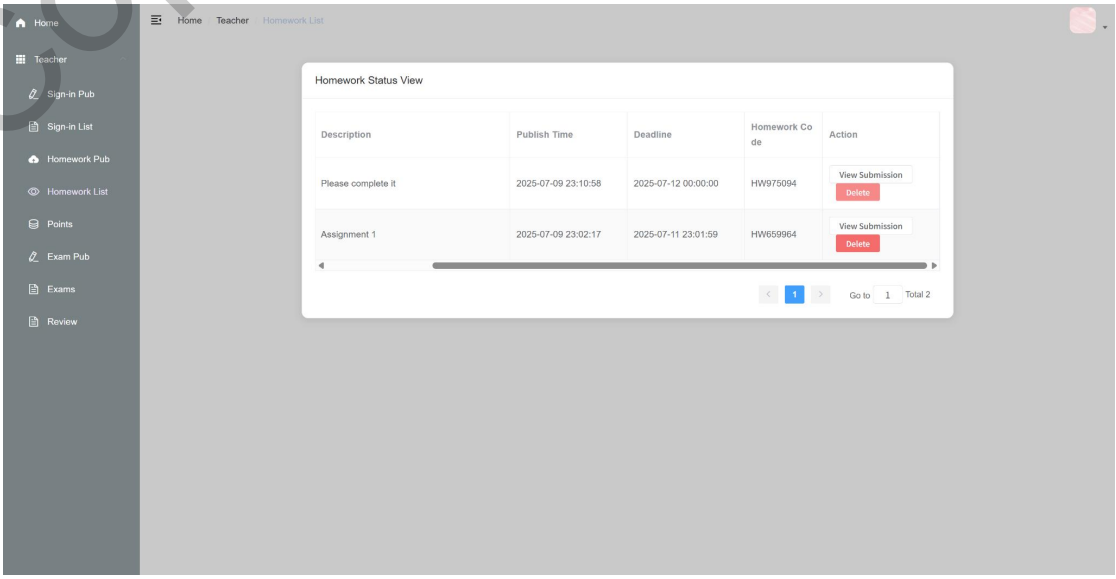


Figure 7 SLRS Homework-list review for teacher

On the Exam List page, teachers can publish and monitor all exams assigned to their students. The page shows each exam's ID, title, description, unique exam code, publishing time, and the name of the teacher who created it. In the "Action" column, teachers can choose to view exam details or copy the exam code to share with students. They also have the option to delete outdated or incorrect exams. This centralized view of assessments helps teachers organize quizzes and tests more effectively and ensures students receive the correct exam materials. Figure 8 shows the exam list.

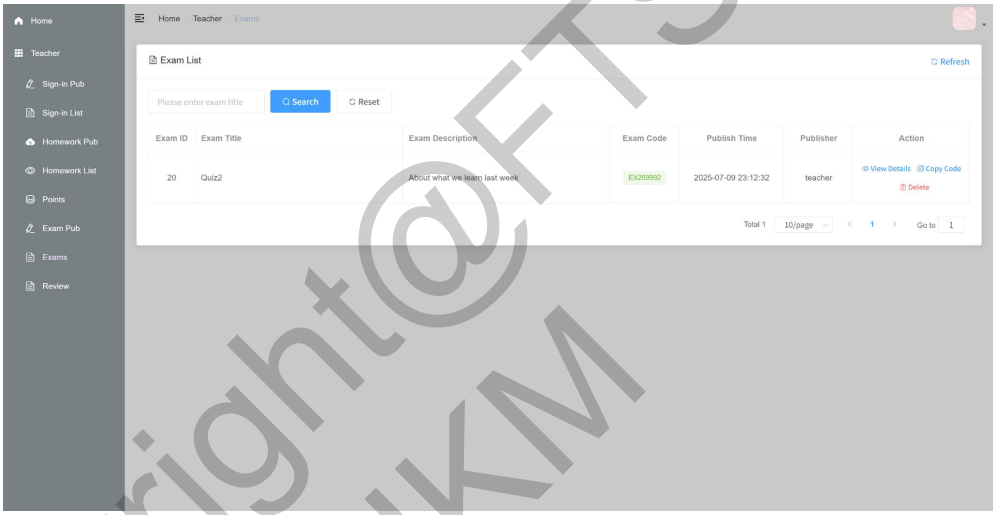


Figure 8 SLRS Exam-list review for teacher

The Review Exam Papers page is designed for grading student exam submissions. Teachers can access each student's answers and compare them against the standard answers. The interface supports multiple choice, true/false, and short answer question types. Teachers can assign or adjust scores for each question directly within the modal window. This system provides a structured and efficient way for teachers to assess student performance, give fair feedback, and finalize grades for their classes. Figure 9 shows the exam paper review page.

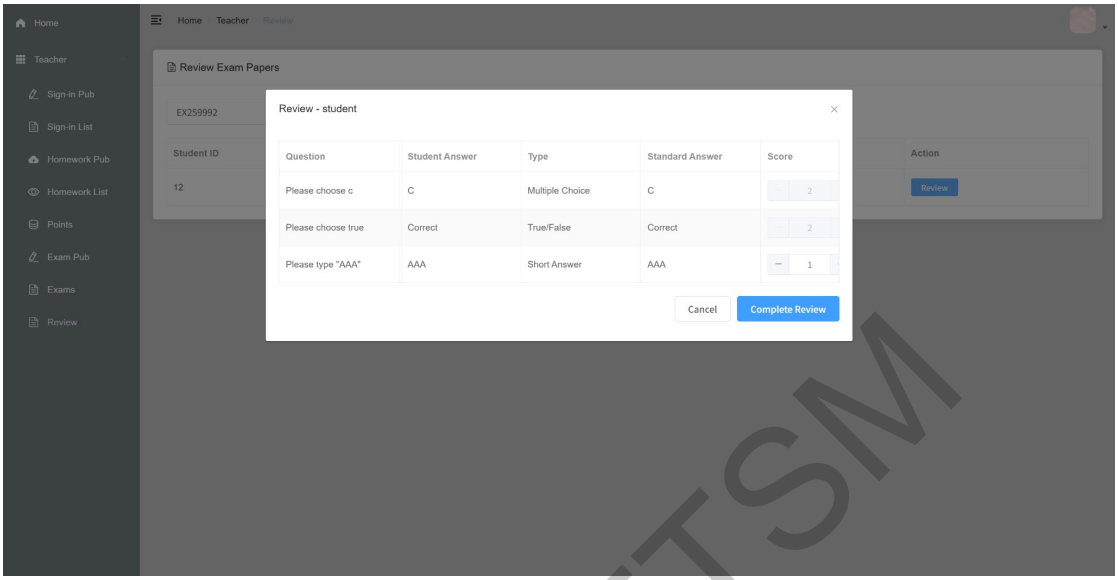


Figure 9 SLRS Exam paper review for teacher

3. Student

This page provides students with a comprehensive view of their sign-in records. Each record includes the course name, the teacher's name, the time of sign-in, the sign-in status (e.g., Normal), the points awarded for that sign-in, and any related remarks. Students can use the search bar to filter records by course name, enabling quick access to specific attendance history. Figure 10 shows the sign-in history for student.

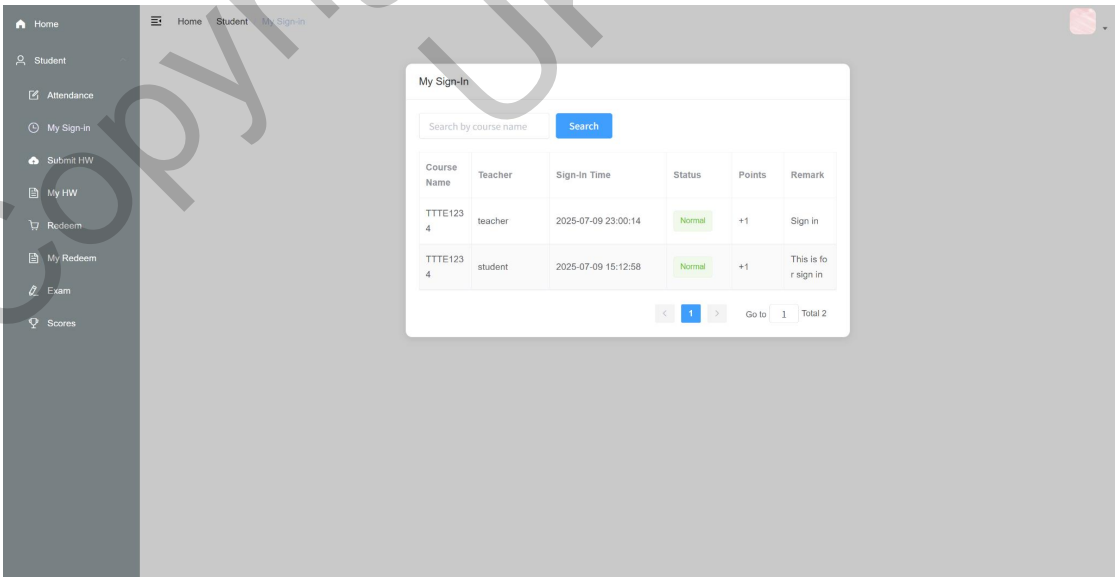


Figure 10 SLRS sign-in history review for student

On the "My Homework" page, students can view all their homework submission statuses. The interface displays each assignment's title, submission time, received score, feedback from the teacher, and a download button to retrieve marked work. The page allows filtering by

homework title, making it easier for students to track progress and performance over time. Figure 11 shows the homework history review for student.

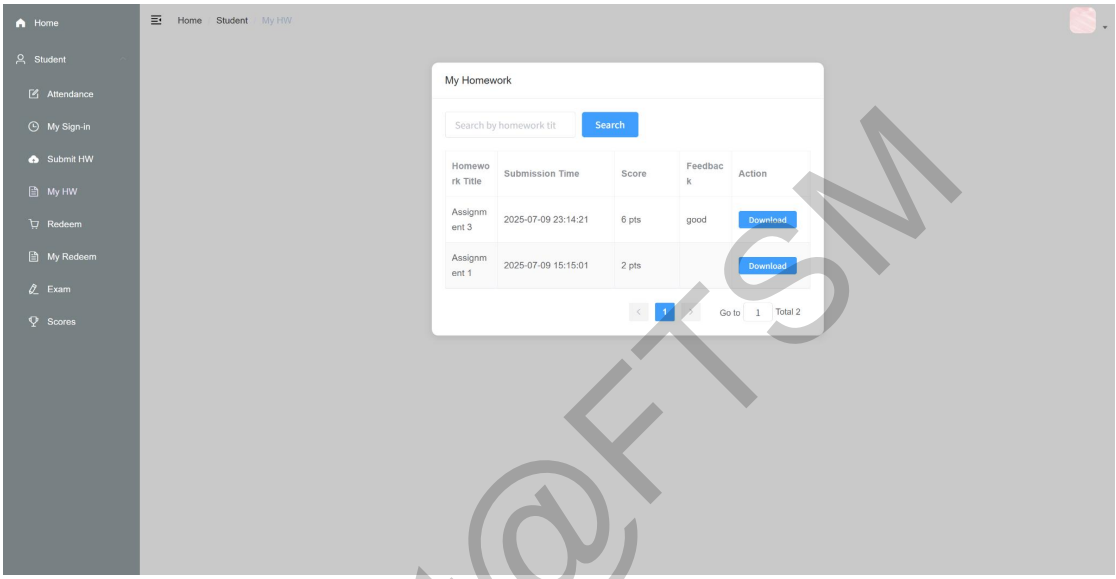


Figure 11 SLRS Homework history review for student

The "My Redeem" section shows students the history of their point redemption activities. For each record, students can see the prize name, points consumed, the time of exchange, the status of the redemption (e.g., completed), and a link to view more details. This encourages students to engage more actively by tracking how their participation translates into tangible rewards.Figure 12 shows the prize redeem history review for student.

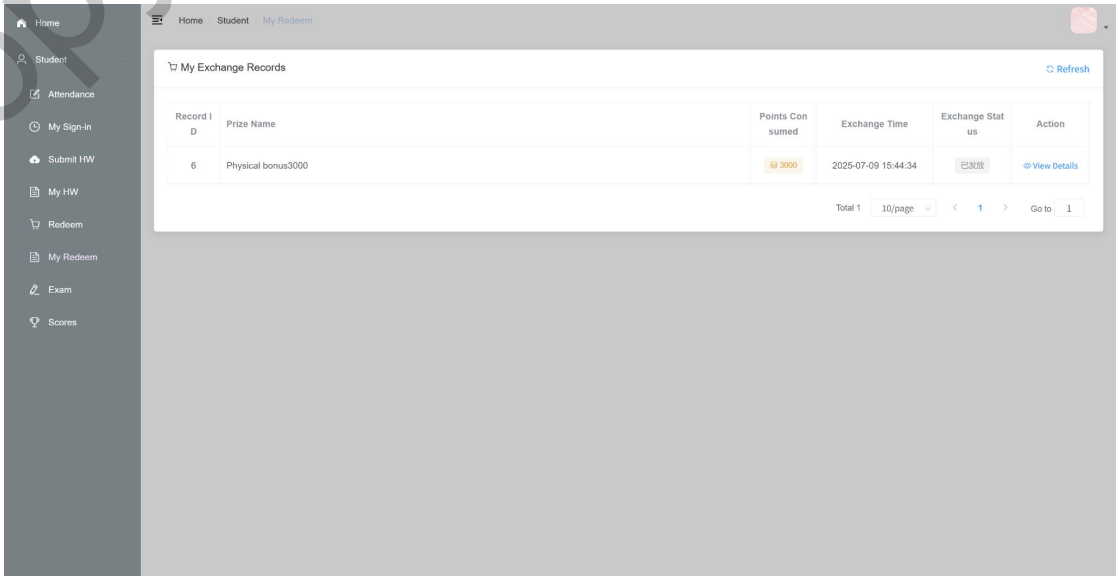


Figure 12 SLRS Prize Redeem history review for student

This page lists all the exams a student has taken, along with the corresponding scores and review statuses. Each row displays the exam name, score received, and whether it has been

reviewed by the teacher. A "Detail" button is available for students to view additional information about each exam. This feature supports transparency and continuous performance monitoring. Figure 13 shows the exam history review for student.

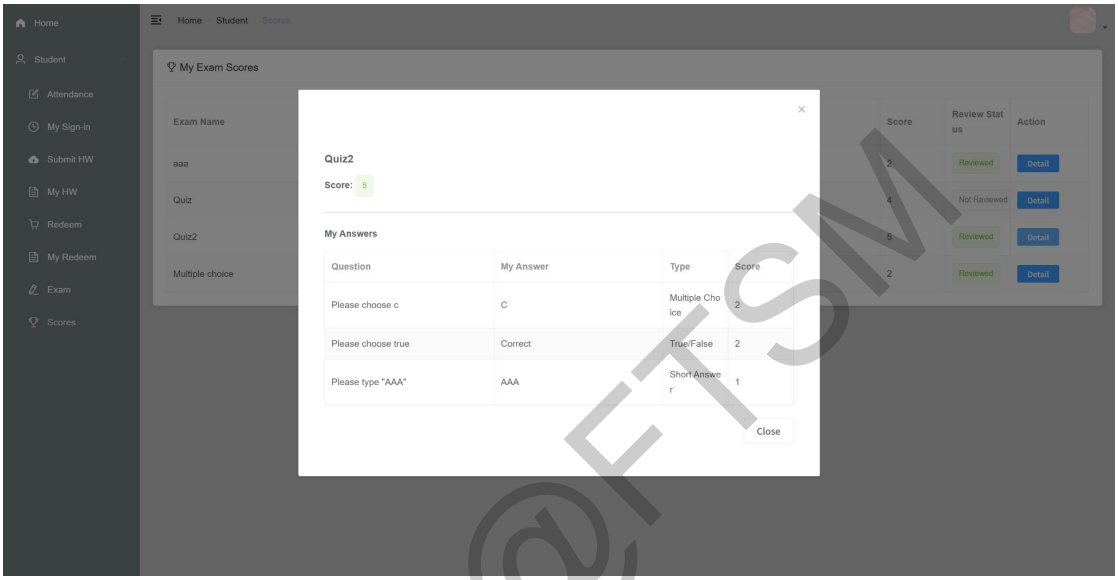


Figure 13 SLRS Exam history review for student

4.2 Testing Data

The testing activities for the Student Learning Reward System were carried out comprehensively in accordance with a predefined test plan and structured test cases. Core functionalities were tested individually before integration testing was performed to ensure end-to-end compatibility across modules. Testing was executed on both local development and staging environments using mock accounts representing different user roles such as students, teachers, and administrators.

Unit testing was conducted on major Vue component methods. This included input validation and response behavior for components like login (handleLogin()), assignment submission (handleSubmit()), attendance (checkIn()), and point redemption (handleExchange()). Each function was tested using both valid and invalid inputs. For instance, entering an incorrect password triggered an error alert (Figure 14). Meanwhile a valid login led to successful dashboard navigation.

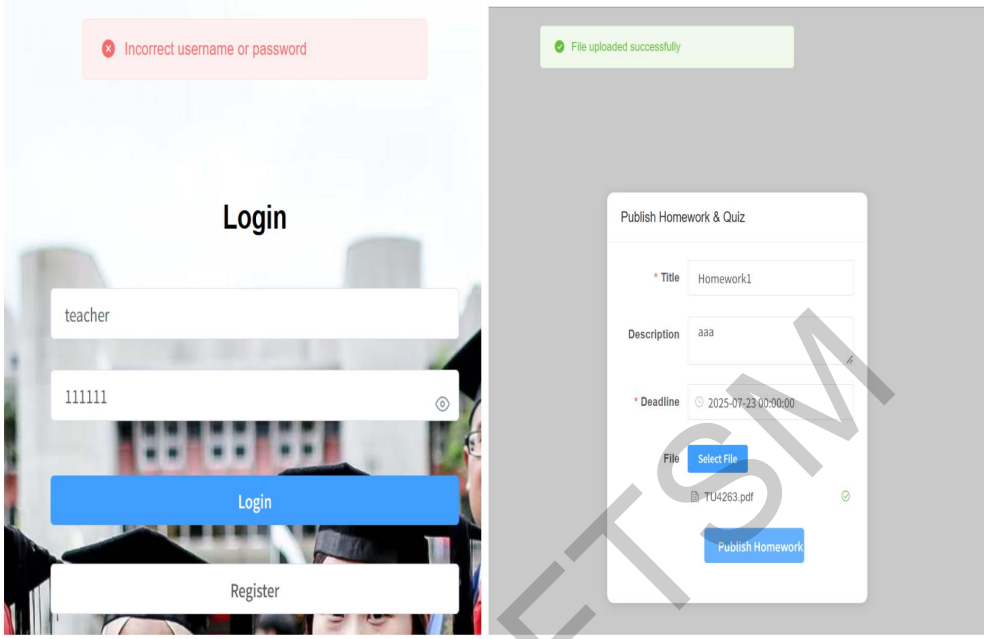


Figure 14 Login Test

Functional testing (black-box testing) was applied through actual interaction with the UI. Registration was tested with valid data and malformed inputs to verify backend validation and error prompts (Figure 15). Assignment publishing (Figure 4.16) and quiz creation (Figure 17) were tested for both success and failure scenarios.

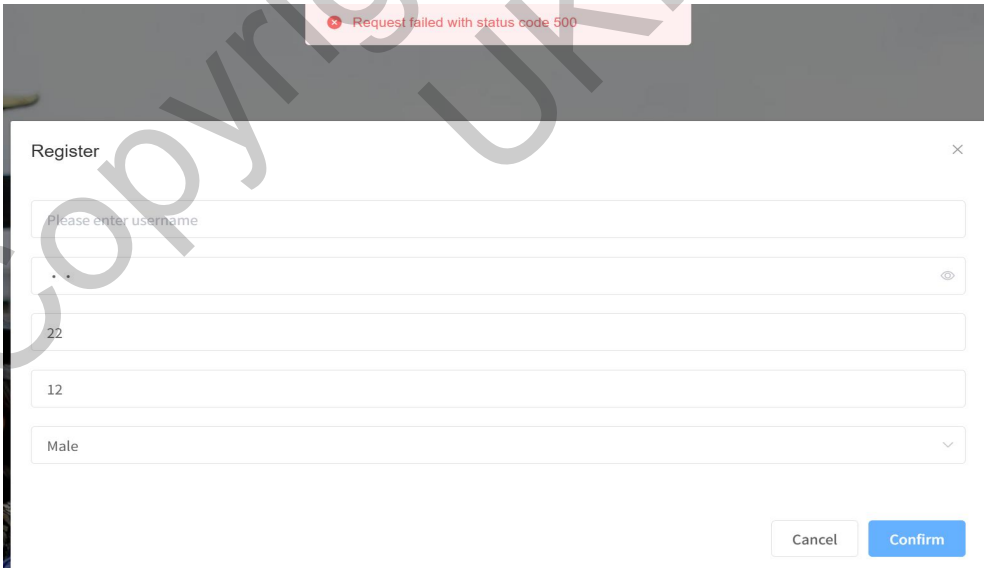


Figure 15 Registration Test

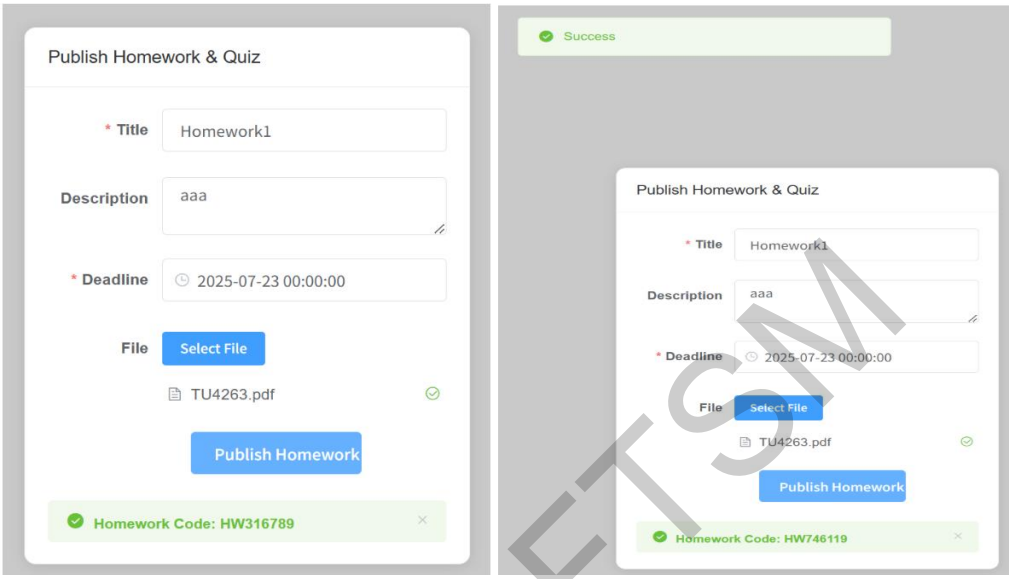


Figure 16 Assignment Publish Test

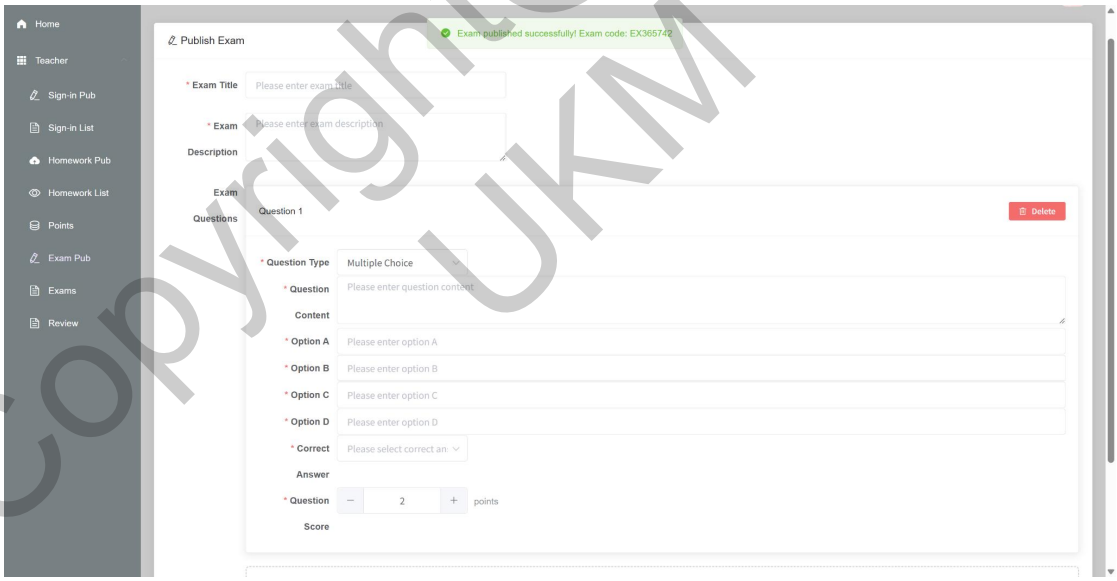


Figure 17 Quiz Publish Test

Attendance publishing and participation were tested using valid, reused, and expired codes to confirm response accuracy (Figures 18 and 19).

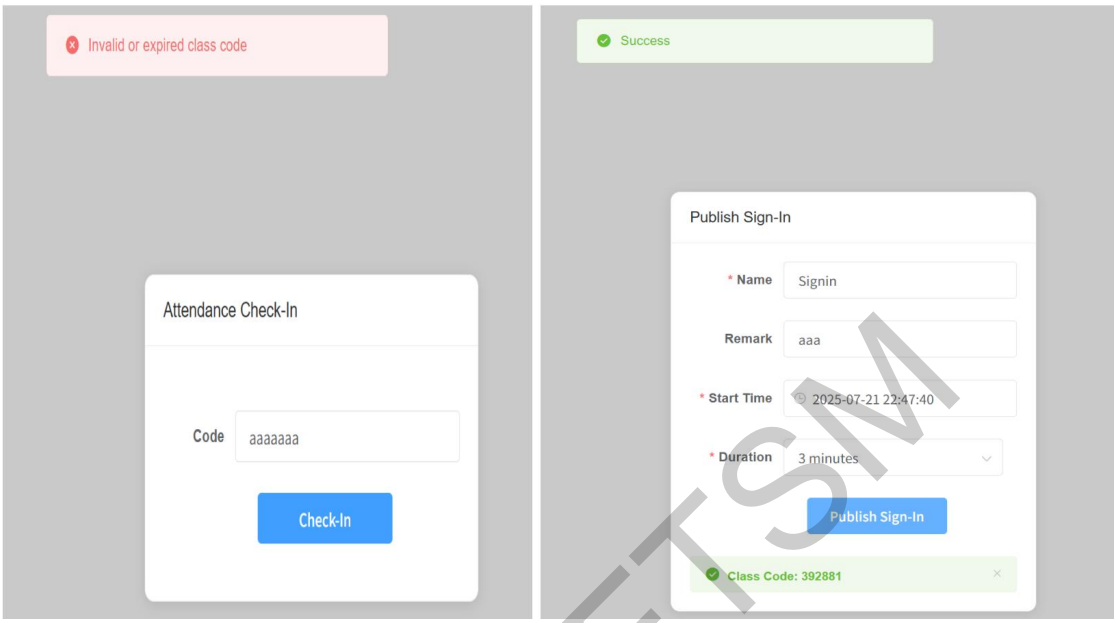
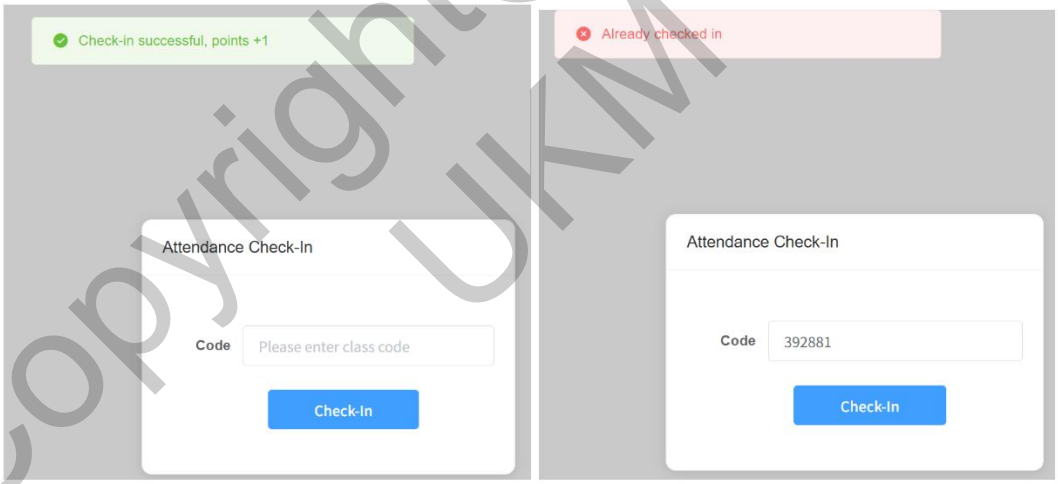


Figure 18 Attendance Publish Test



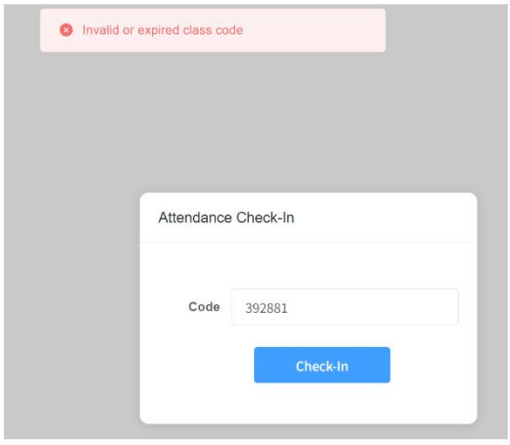


Figure 4.19 Attendance Sign in Test

Similarly, uploading a file without selecting one showed an appropriate warning, whereas successful submissions returned a green confirmation message (Figure 20).

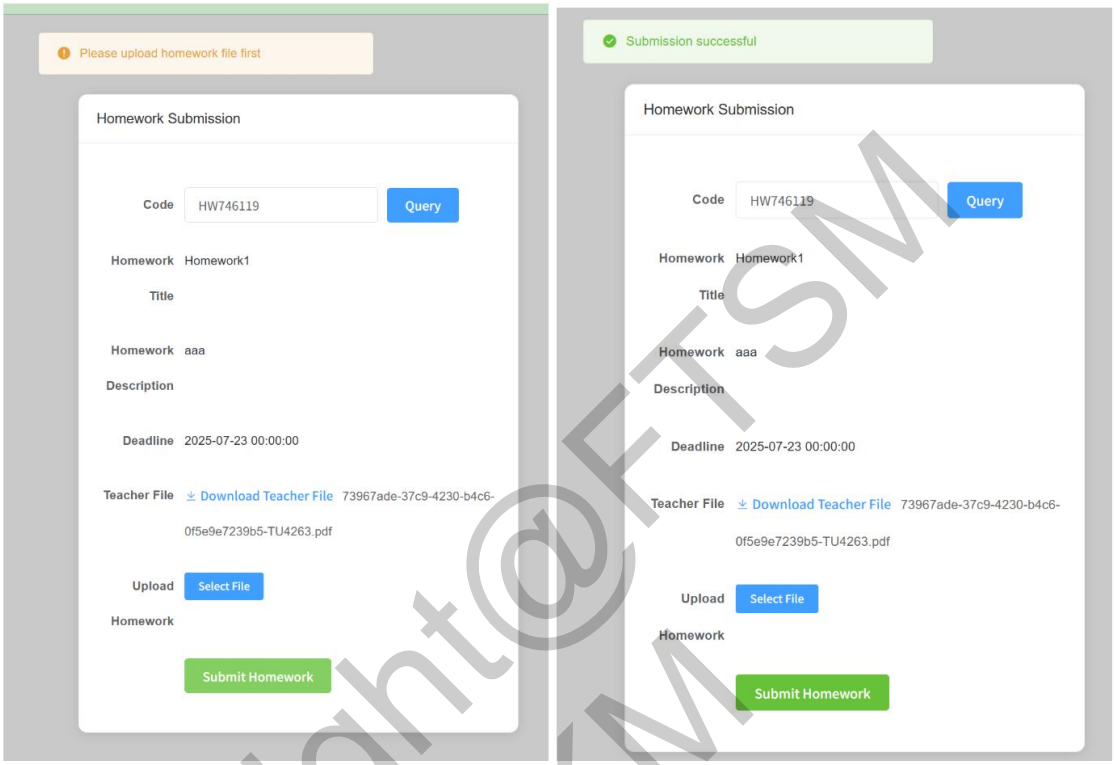


Figure 20 Assignment Upload Test

Reward redemption was also validated through conditions of sufficient and insufficient points (Figure 4.21).

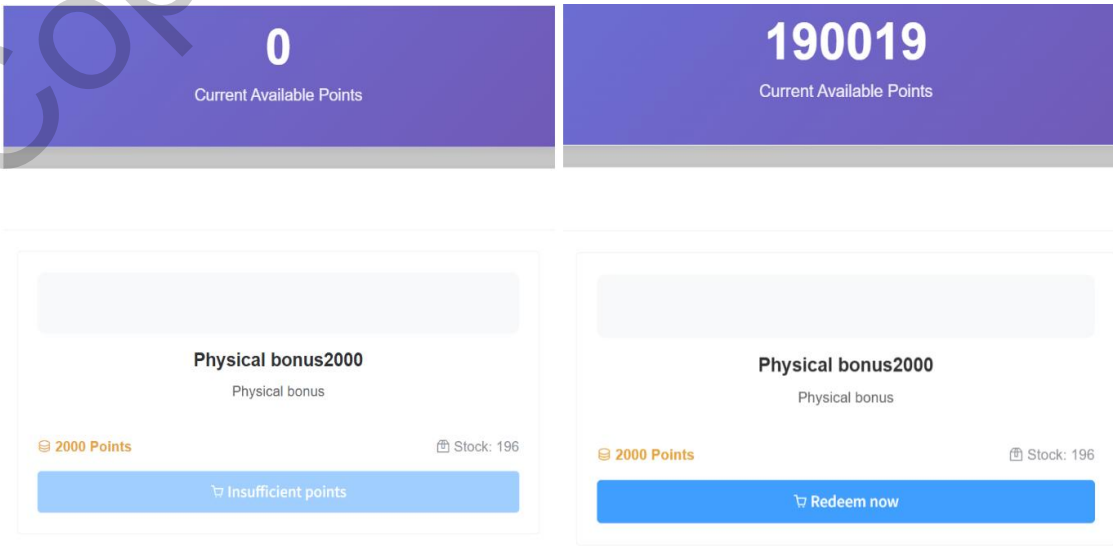


Figure 21 Reward Redeem Test

User acceptance testing (UAT) was performed by selected real users, including 3 students and 2 lecturers. They were tasked with common operations such as logging in, submitting quizzes, uploading homework, and redeeming rewards. Feedback from this group indicated that the interface was intuitive, system responses were timely, and error messages were helpful. All tests were conducted using Google Chrome and Microsoft Edge on both desktop and mobile views to verify cross-browser responsiveness and compatibility. Overall, testing validated that the system functions met their specifications. Minor UI alignment bugs and input validation gaps were fixed after testing, prior to final deployment. Furthermore, the testing focused on the clarity and responsiveness of the interface. Testers commented on visual feedback mechanisms such as error messages (e.g., "Invalid or expired class code" in Figure 19 which was mentioned earlier), success notifications (e.g., "Homework submitted successfully" in Figure 20), and form guidance. Button labeling, placeholder text, and visual cues were found to be understandable, contributing to a positive user experience. Figure 22 until 24 are examples of a student attempting an exam and its submission. Figure 22shows fail attempt due to non-existence exam code, followed by the correct code.

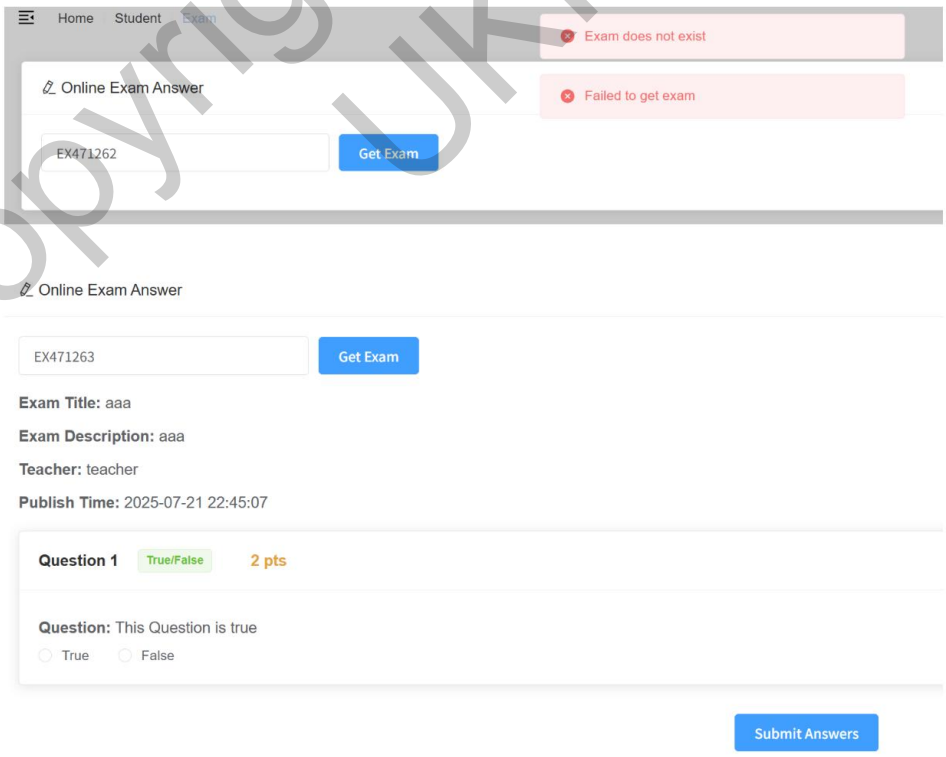


Figure 22 Exam Attend Test

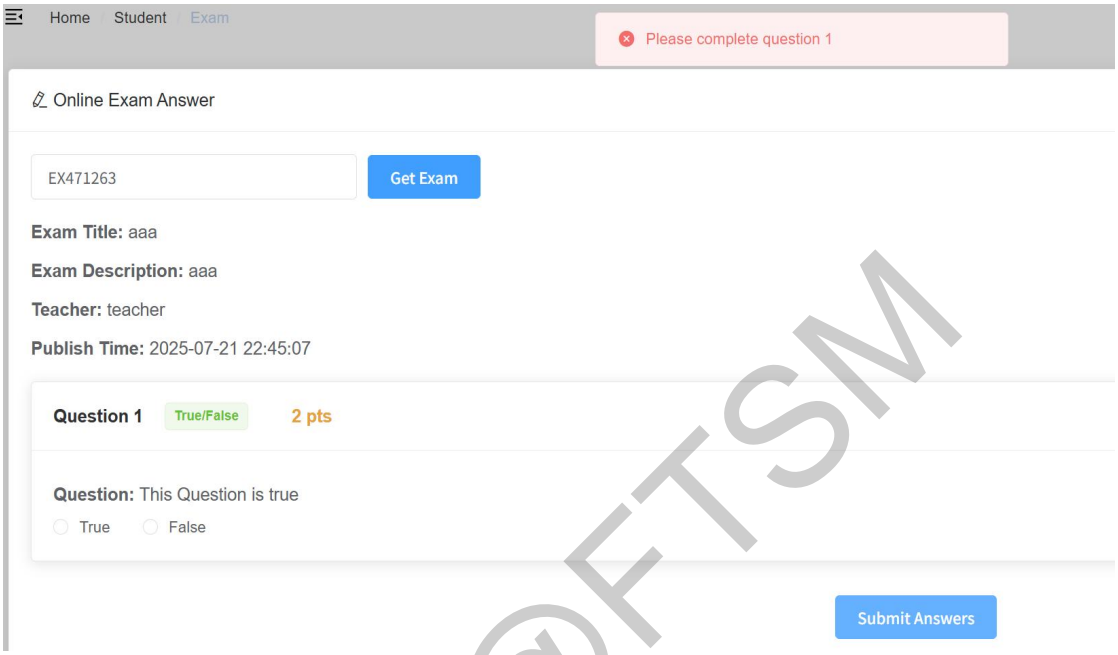


Figure 23 Exam Completion Test

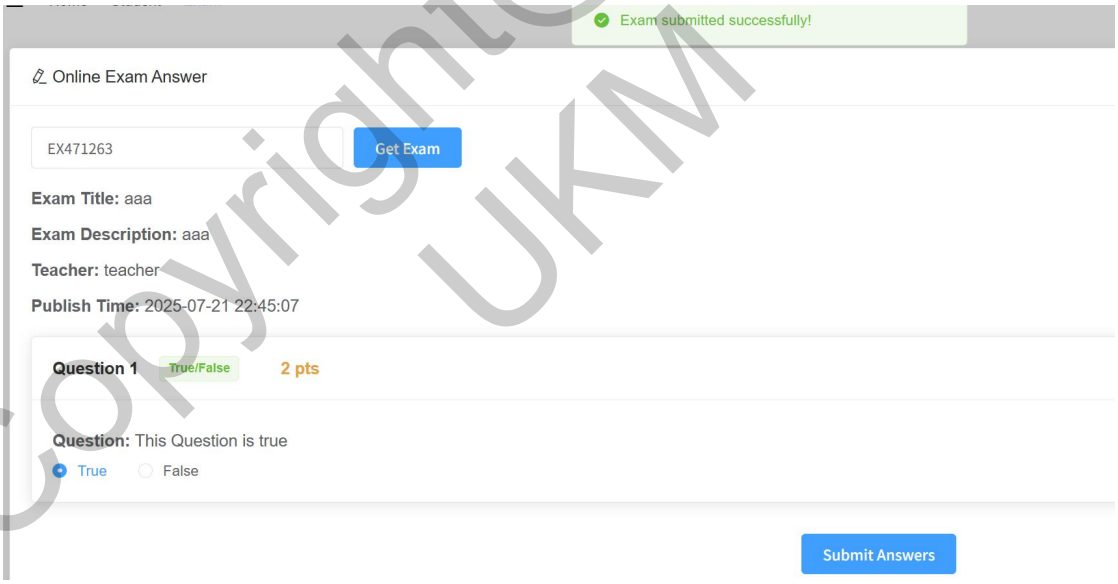


Figure 24 Exam Submission Test

5.0 CONCLUSION

In chapter IV, detailed system implementation and testing of the Student Learning Reward System (LRS) is carried out to assure that the system meets the goals and requirements determined earlier. The system was hosted on the FTSM fyp server. System testing on a hosted server makes sure that the operations that we are

performing to core system availability are accessible, and the flow is logical and systematic. The interface implementation also emphasizes user friendliness and user accessibility. These include the key interfaces of login, registration, dashboard, assignment, quiz, attendance and reward points, and present detailed design for the same. And each interface is constructed so that it is usable and safe and secure at the user/system interface. These factors were also evaluated in the usability test which was conducted with real users which includes students and teachers. Findings from usability tests show that most users found the system easy to use, with clear layout and intuitive design. Over 80% of students responded positively to the reward mechanism, and both students and teachers agreed that the system made teaching and learning activities more engaging. The user interface was rated as simple, effective, and responsive, contributing to a high level of satisfaction.

PTA-FTSM-2025-A197960

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