Project Learn: The Development and Assessment of a Cross-Platform Tutor Finder

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Abstract:

The creation of an online tutor finder application, called "Project Learn", aimed to address the difficulty in finding a tutor for any subject in today's fast-paced world. To achieve this, the study utilized a developmental research design to create an application that connects students with qualified tutors. Students can view a tutor's background and the subjects they teach before choosing the best fit for their needs. To evaluate the system's technical quality, a survey was conducted with 20 end-users and 10 IT-experts. The survey was based on ISO 25010 software quality standards and included components such as functional suitability, reliability, usability, performance efficiency, security, compatibility, portability, and maintainability. The survey results indicated that both the end-users and IT-experts rated the system above 3.26, which equates to a "very acceptable" grade. This suggests that the system's overall internal and external performance exhibited consistency and met the compliance requirements. However, there is still room for improvement to better serve the needs of its users. The success of the development and assessment of the online tutor finder application demonstrates the potential impact it can have in connecting students with qualified tutors. The study's use of a developmental research design and adherence to ISO 25010 software quality standards ensured the technical quality of the system. With further improvements, the application can continue to make a significant impact in helping students find the right tutor to achieve academic success.

Keywords: *assessment, cross-platform, development, project learn, tutor finder.*

Introduction

Education enables individuals to gain the skills, techniques, information, and knowledge necessary to recognize, comprehend, and respect their responsibilities to society, their families, and the nation (Sharna, 2018). Additionally, education helps individuals acquire knowledge and develop self-confidence (Greener & Wakefield, 2015). According to Al-Shuaibi (2014), education in a specific field empowers people to think, feel, and act in a way that contributes to their success and enhances not only their personal happiness but also the community as a whole. The pandemic that began in 2019 (Cennimo, 2023) resulted in the temporary closure of many facilities and businesses due to coronaviruses, which are a type of virus. COVID-19, a respiratory disease pandemic caused by SARS-CoV-2, a coronavirus identified in 2019, has significantly affected the education sector since its emergence (Pacheco-

Garcia & Serafin-Lopez, 2023). The pandemic has worsened the learning problem, and children in almost every country have fallen behind in their education (Baumgaertner, 2023).

In response to the COVID-19 outbreak, educational institutions in the Philippines and different countries worldwide acted swiftly by cancelling face-to-face classes and transitioning to online learning. The local government units (LGUs) in the Philippines played a vital role in mitigating the pandemic's adverse effects by implementing strong border control, deploying early lockdowns, developing quarantine facilities, and efficiently communicating with the public while monitoring their activities (Talabis et al., 2021). By April, the Philippine government and education officials had officially discontinued face-to-face classes, closed primary and secondary schools, and shortened the school year while improvising a grading system for the shorter term (Asia Society, n.d.). However, challenges and difficulties persisted in the implementation of online learning since its introduction. One of its disadvantages is the lack of personal interaction (Gautam, 2020). Additionally, online classes are unable to accommodate the thousands of students that attempt to participate in discussions. Furthermore, online education can be challenging for disciplines that require hands-on experience.

Project Learn, a web-based tool, developed in response to the aforementioned concerns. The development and evaluation of a cross-platform tutor finder aimed to create a platform for students to locate tutors outside of the classroom, depending on the disciplines in which they needed more assistance. This program ensures that experienced experts sign up and encourages tutors who are passionate about assisting students in need to join this platform. Students should view online learning as a supplement to and expansion of traditional learning methods. Even the best online course cannot fully replace personal interaction with a teacher or the interpersonal bonds that emerge within a group.

The Innovations and Challenges in Online Tutoring and Tutor Finder App

Mandal (2016) aimed to create an interactive tool called "Tutor Finder" to help students and parents find private tutors. Despite the world's advancement and proliferation of smartphones (Thangamani et al., 2018), the search for tutors had always been challenging. However, with the increasing availability of online tutoring services, students were able to easily access tutors that matched their interests.

New technology had made learning more effective, efficient, flexible, and comfortable for students. By using smart devices and wireless networks, learners could access digital materials and enjoy personalized and seamless learning experiences. Therefore, creating a safe, reliable, and convenient platform that connected students with tutors was essential for the app's success (Saad et al., 2019).

Online tutoring solved infrastructural issues caused by the lack of physical learning space and enabled students to connect with learning content outside of the classroom (Dhawan, 2020). Furthermore, individual tutoring significantly improved learners' understanding and attitudes compared to classroom tutoring (Jeffries, Baldwin, Zalk, & Taylor, 2020). A multiplatform chatbot or GPS security system, such as in Grab Tutor, could also serve as a replacement tutor, making it easier for students to find suitable tutors and ensuring their safety during tutoring sessions (Lee et al., 2020).

Exploring Factors Affecting Online Learning and Tutoring

Researchers extensively studied online learning to comprehend its advantages, limitations, and recommendations from teachers and students' standpoints. Carrillo and Flores (2020) stressed the need for using a "medium" to enhance teaching and learning practices, highlighting social presence, cognitive presence, and instructional presence. Additionally, Wang et al. (2022) proposed that learners' interaction with the course material had the most significant impact on student learning, making it a crucial element of online learning engagement.

In recent years, the growing popularity of online tutoring services did not guarantee a high success rate due to students' overconfidence (Az-Zahra et al., 2020). This led to a need to understand emotions, motivation, and disengagement, which are critical to the learning process. Yale (2017) defined this need as "understanding how it affects and provides feedback." Sharma (2018) cautioned against e-learning's long-term use due to its superficiality, but online tutoring proved to be a valuable tool in enhancing academic performance, psychological well-being, and socio-emotional skills (Carlana & La Ferrara, 2021).

Furthermore, researchers found that the integration of tutoring applications with self-directed learning improved students' statistical analysis skills and facilitated faster learning (Sawanan, 2021). In general, online learning and tutoring had both advantages and limitations, and it was crucial to comprehend the various factors involved to effectively utilize these methods for better learning outcomes.

Statement of the Problem

The study was designed to create and evaluate a tutor-finding application that provided a platform for students to find tutors outside of the classroom based on the subjects for which they required additional assistance. Specifically, it aimed to describe the following:

1.	How may the design and development of the system be described in terms of System Development Lifecycle model (SDLC) which include

1.1.	Planning;

1.2.	Defining Requirements;

1.3.	Design and Prototyping;

1.4.	Software Development;

1.5.	Testing;

1.6.	Deployment and

1.7.	Operations and Maintenance?

2.	How may the IT experts assess the system based on ISO 25010 standards in terms of

2.1.	Functional Suitability;

2.2.	Performance Efficiency;

2.3.	Compatibility;

2.4.	Usability;

2.5.	Reliability;

2.6.	Security;

2.7.	Maintainability and

2.8.	Portability?

3.	How may the end-users assess the system based on quality of use in terms of

3.1.	Functional Suitability;

3.2.	Reliability; and

3.3.	Usability?

Materials and Methods

The researchers in this study employed a developmental research design to examine the changes that occur during the development of a system. Richey, Klein, and Nelson (2004) state that developmental research is a type of qualitative research that systematically studies the creation and analysis of educational processes, products, and programs, ensuring internal consistency and effectiveness standards are met. The developmental research design allowed the researchers to address specific issues that may arise during the development of the system and improve it accordingly.

Table 1. Distribution of Respondents

Type of Respondents	Frequency	Percentage
IT Experts	10	33.33%
End-Users	20	66.67%
Total	30	100.00

The researchers conducted the study at a learning institution in the municipality of Sto Domingo, Nueva Ecija, Philippines. Using purposive sampling technique, the respondents were identified. Two sets of respondents

participated in this study: IT experts and end-users. The respondents for the study were intentionally selected by the researchers. Table 1 presents the frequency and percentage distribution of the respondents.

The researchers adjusted two sets of instruments obtained from existing available instruments to evaluate the technical features and quality of the system, but they modified them to fit the context of this study. In gathering data, informed consent was obtained from respondents, and all necessary information regarding the project was explained. Subsequently, the researchers administered the instrument through Google Forms. The collected data were treated with utmost care, confidentiality, and anonymity and were exclusively used for this study.

To tackle the identified research problems, the researchers utilized various data analysis techniques. They followed the stages of SDLC to design and develop the system, as stated in the first problem statement. To assess the technical aspect of the system, IT experts computed the mean rating of their evaluation. The researchers used the scoring guide presented in Table 2a and 2b to treat the data and address the third research problem.

Table 2a. Scoring Range and Verbal Interpretation

Range	Functional Suitability	Performance Efficiency	Compatibility	Usability
3.26 – 4.00	Very Functional	Very Efficient	Very Compatible	Very Usable
2.56 – 3.25	Functional	Efficient	Compatible	Usable
1.76 – 2.50	Needs Improvement	Needs Improvement	Needs Improvement	Needs Improvement
1.00 – 1.75	Poor	Poor	Poor	Poor

Table 2b. Scoring Range and Verbal Interpretation

Range	Reliability	Security	Maintainability	Portability	Acceptability
3.26 – 4.00	Very Reliable	Very Secured	Very Maintainable	Very Portable	Very Acceptable
2.56 – 3.25	Reliable	Secured	Maintainable	Portable	Acceptable
1.76 – 2.50	Needs Improvement	Needs Improvement	Needs Improvement	Needs Improvement	Slightly Acceptable
1.00 – 1.75	Poor	Poor	Poor	Poor	Not Acceptable

Results and Discussion

The Design and Development of the System based on the stages of the SDLC

1) Planning Phase

The "planning stage" was exactly what it sounded like: the phase in which developers planned for the upcoming project. It involved defining the problem and scope of any existing systems, as well as determining the objectives for their new systems. During this phase, the researchers constructed a Gantt chart that illustrated the planning they had undertaken. The chart depicted the key activities and timescales involved in implementing Project Learn. It showed how the system could be implemented. The researchers spent some time determining how to start and end the system by gathering all the requirements and resources. By planning the project in detail, scheduling the tasks, and identifying dependencies between them, they were able to build the system while meeting the requirements.

2) Defining Requirements

Requirement gathering and analysis phase was the most crucial phase of the SDLC because it was when the project team started to comprehend what the customer desired from the project. During this phase, the researchers developed a web-based app that facilitated high school students in finding a tutor who could assist them in achieving their full potential and enabled tutors and students to connect. Figure 1

presents the HIPO diagram used by the researchers.

3) Designing and Prototyping

During this phase, the researchers created the designs and conceptual foundation required to develop the graphical user interface, capabilities, and database of the system, as stated by Preston in 2020. Figure 2 displays the Project Learn Use Case Diagram, demonstrating the different user functions. Users can register by entering their name, and the diagram illustrates the data flow and interactions.

Meanwhile, the Entity-Relationship Diagram used for this study is presented in Figure 3. The researchers utilized Entity-Relationship Diagrams (ERDs) to define and clarify the relationships among the entities incorporated in Project Learn. The following entity-relationship diagram illustrates the relationship and dependency of user entities. The researchers determined the entities and added attributes to each entity during this process.

In figures 4, 5, and 6, the level 1 representation of the Data Flow Diagram for students, tutor, and administrators are shown respectively.

The succeeding figures present the sample user interfaces of the developed system.

4) Testing Phase

By following the SDLC, it was possible to create affordable software of high quality in the shortest time possible, meeting and surpassing all customer expectations and requirements. In that phase, the researchers conducted UI testing to ensure that the system's contained elements, such as menus, buttons, text boxes, and images, worked properly and responsively. They also identified any bugs or errors in the system's operation.

5) Deployment Phase

After testing, the researchers finalized the overall design. The design enabled the production installation and customer acceptance of the software. To ensure successful software execution, completeness, and correctness, they required all test cases to be verified. This phase involved the deployment of the system following the successful completion of accumulated tests. The researchers accomplished all the necessary tests and ensured the system met the necessary standards before proceeding with deployment.
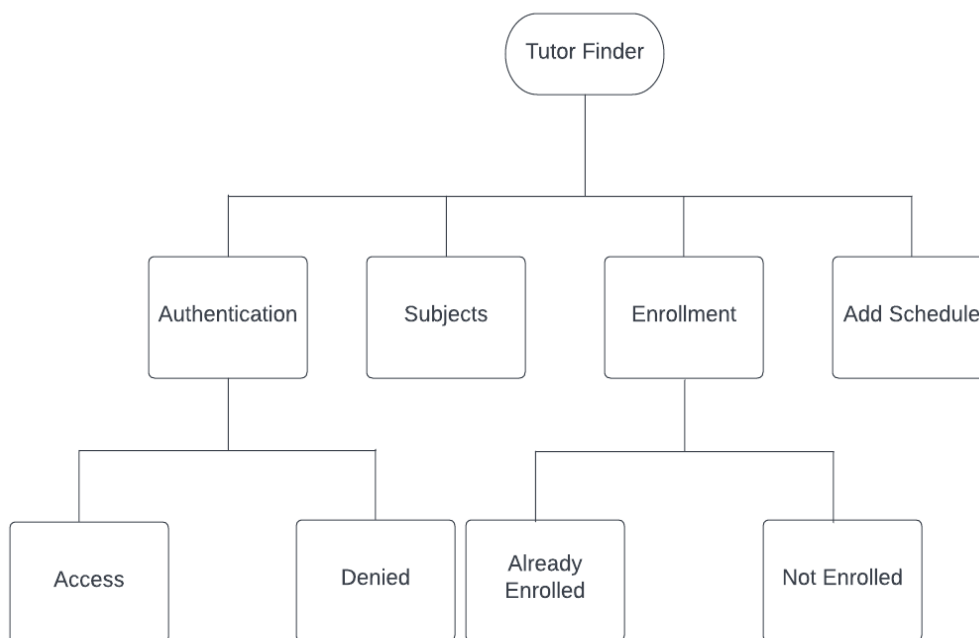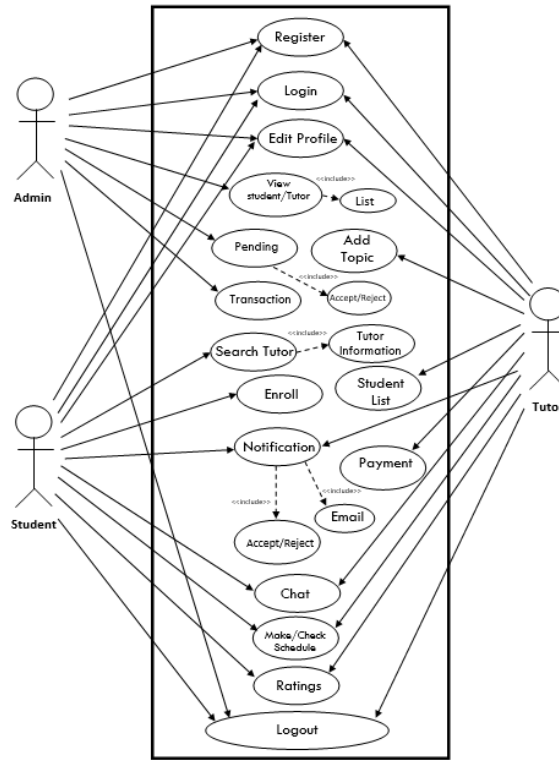
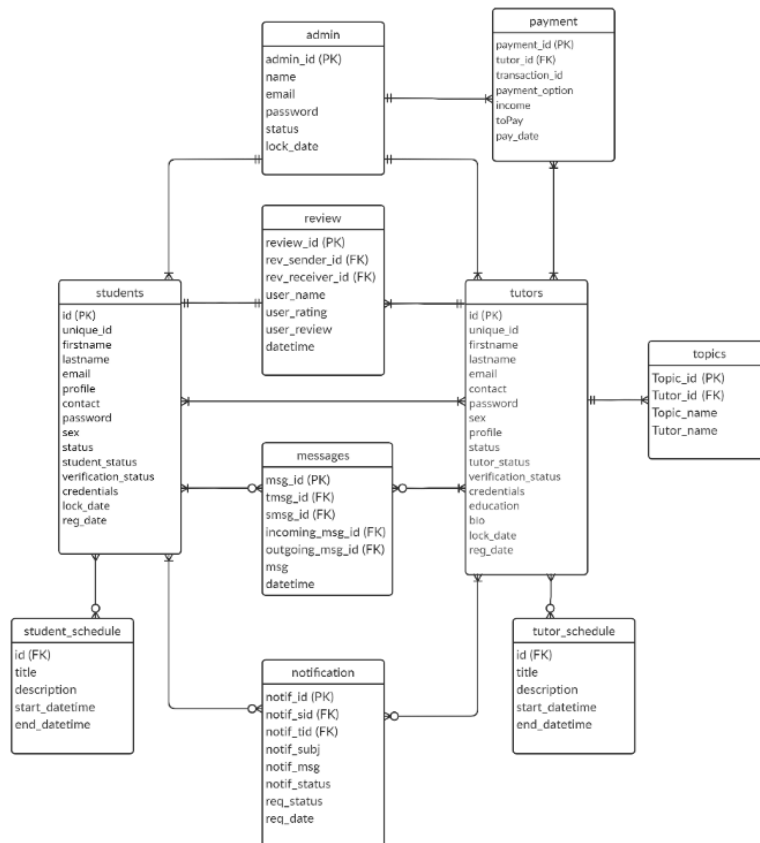

Figure 1. HIPO Diagram

Figure 2. Use-Case Diagram
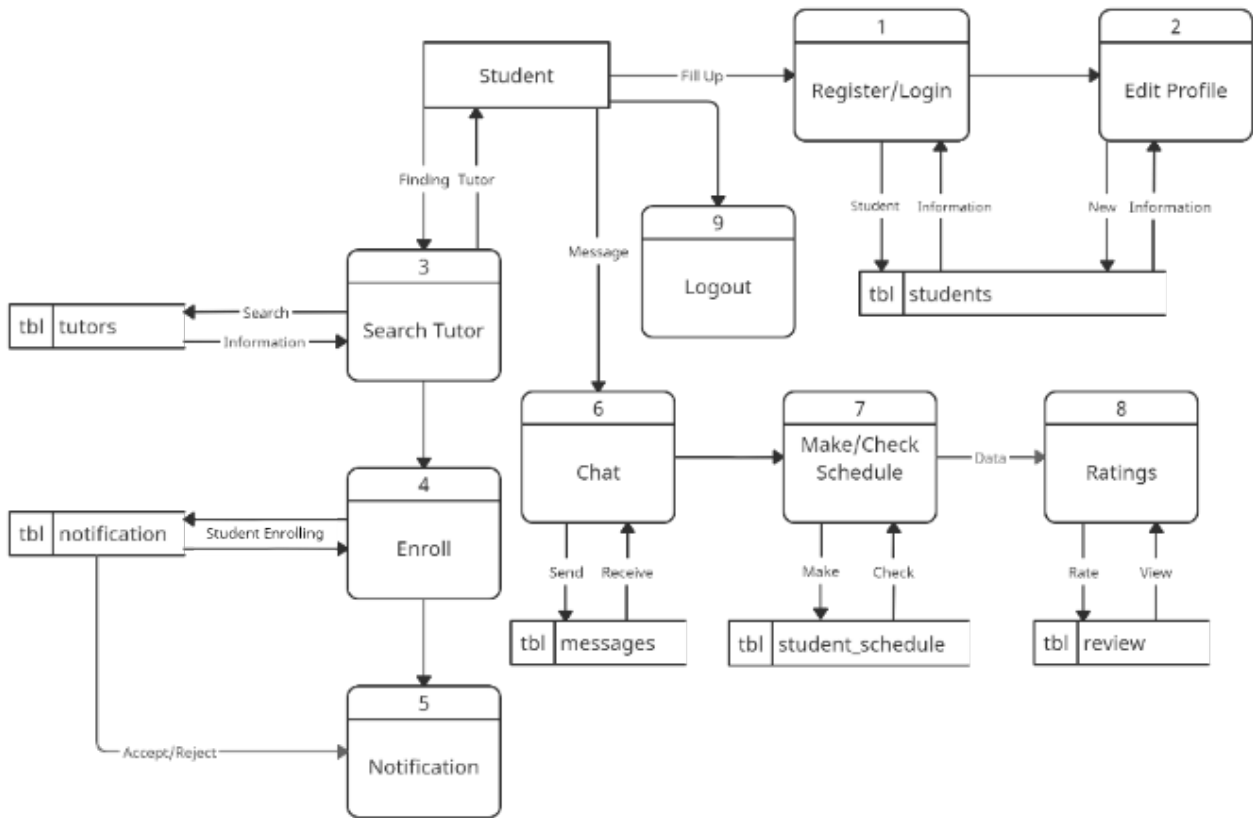

Figure 3. Entity Relationship Diagram

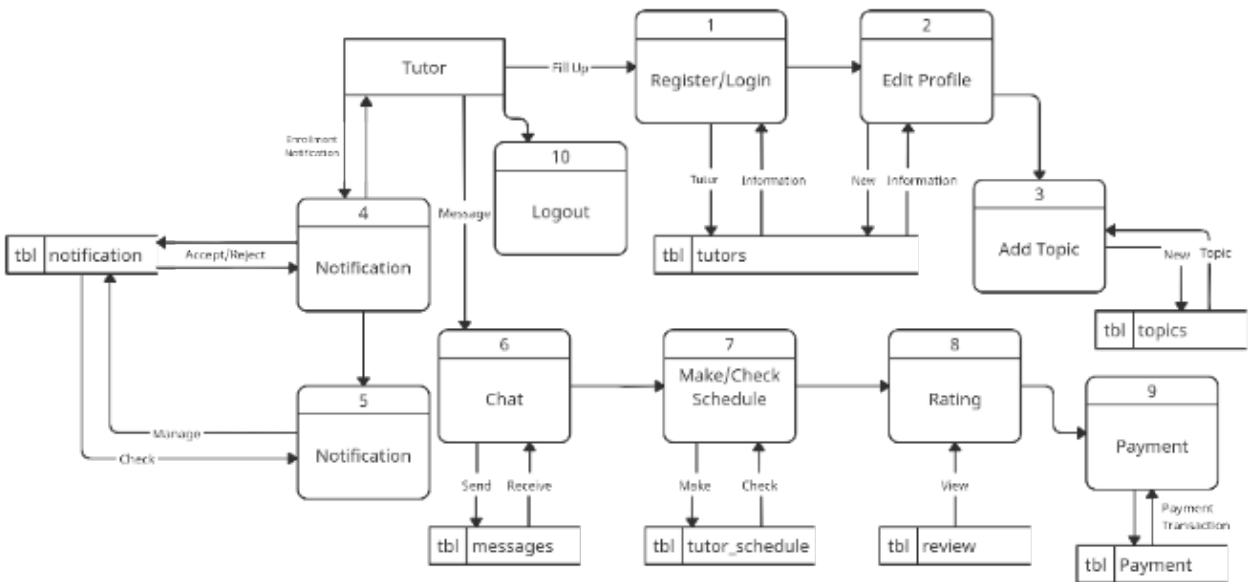**Figure 4. Level 1 DFD Representation for Students**

Figure 5. Level 1 DFD Representation for Tutor

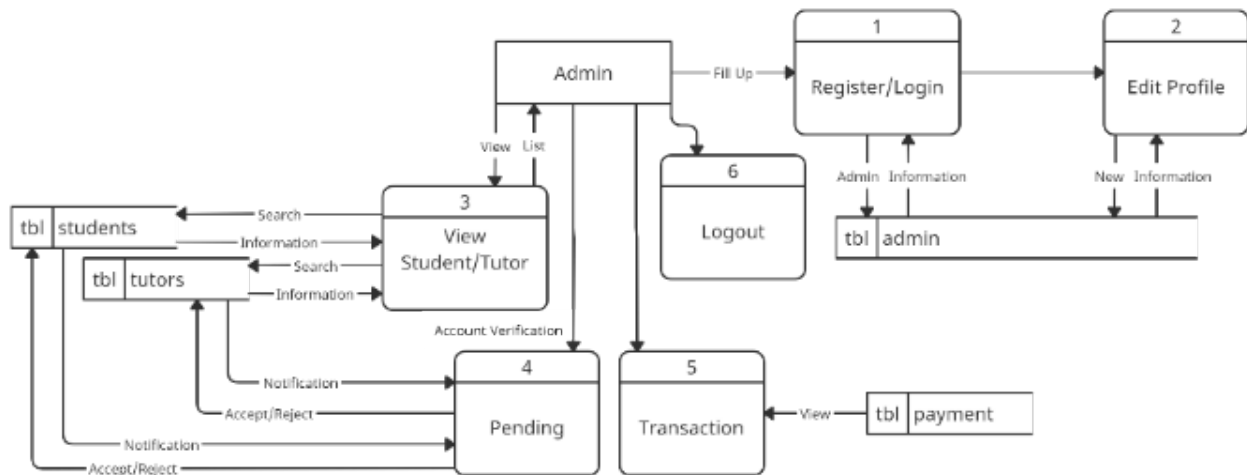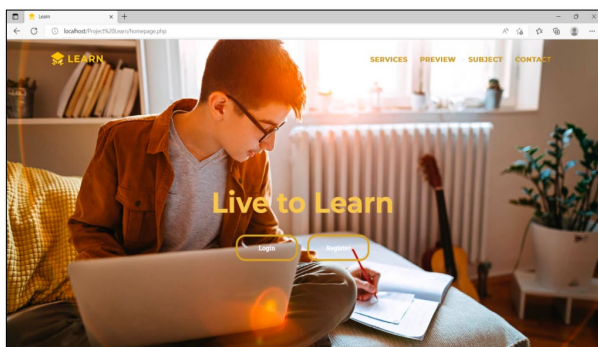**Figure 6. Level 1 DFD Representation for Administrators**
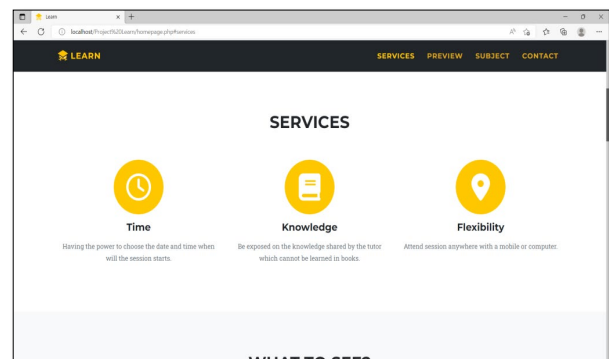

Figure 7. Homepage
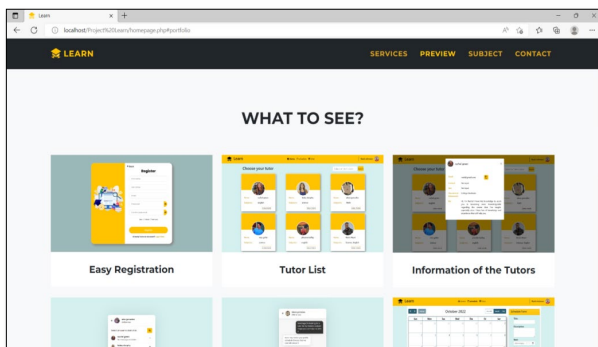

Figure 8. Services
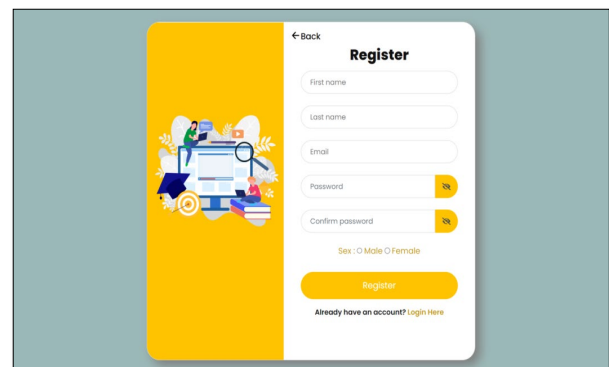

Figure 9. Preview Page

Figure 10. Registration Form

6) Operations and Maintenance Phase

In this stage, the researchers conducted various activities, including corrective, adaptive, perfective, and preventive maintenance. For corrective maintenance, the software addressed errors, defects, and faults throughout the system.

The primary goal of the researchers was correctness, and they scrutinized the system if it ever made a mistake. In adaptive maintenance, the researchers focused on unexpected changes that occurred in the system. The researchers could not always handle the changes that

happened in the system, such as sudden inability to log in because the platform changed how its application programming interface (API) authenticated users. Therefore, a software update was necessitated. Preventive maintenance was the focus of the researchers, who concentrated on software maintenance aimed at improving the user experience through functional enhancement. They focused on the evolution of the system. Lastly, preventive maintenance continuously adapted and changed the system, carrying out routine scheduled maintenance to avoid future unanticipated breakdowns.
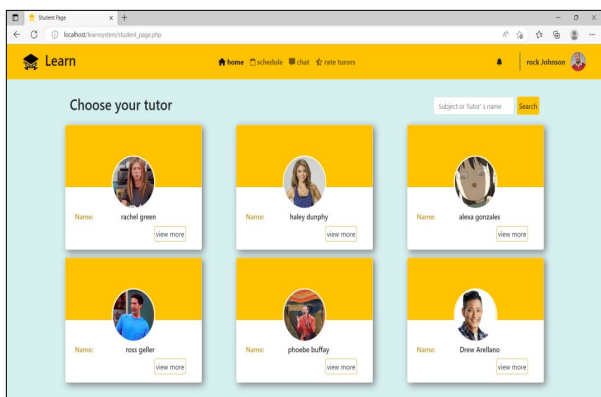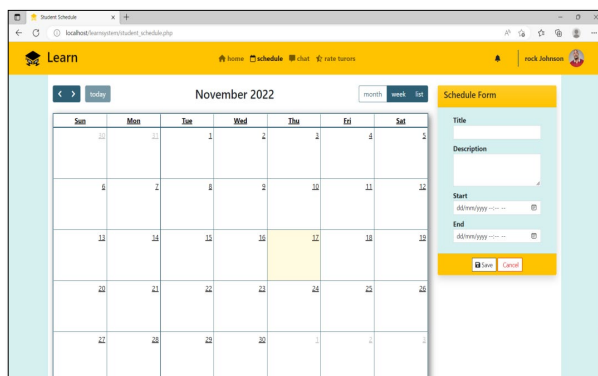

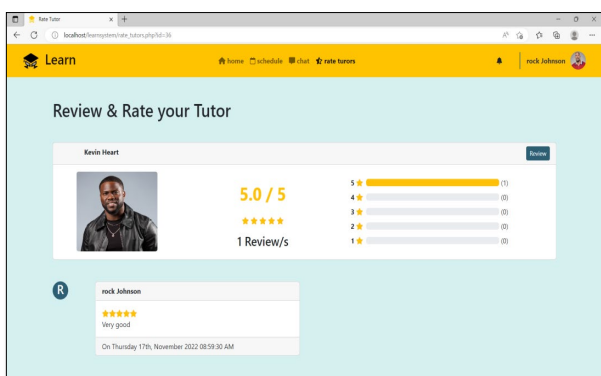**Figure 11. Students' Page**

Figure 12. Scheduling Form

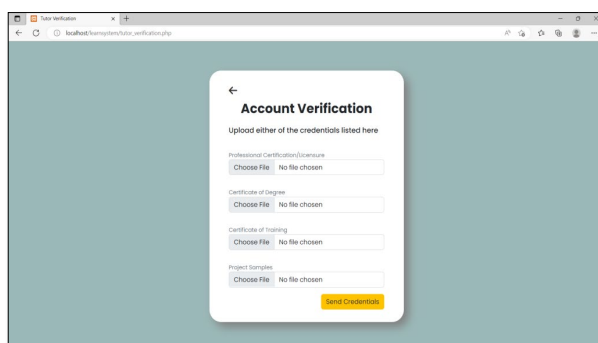**Figure 13. Rating Tutors Form**

Figure 14. Account Verification Form

The Assessment on the Technical Features of the System by the IT Experts

IT experts conducted an assessment on the technical features of the system, which was discussed in this section. This assessment was a crucial step in the development of the software system as it involved evaluating the technical aspects of the system to ensure functionality and efficiency. The experts reviewed and tested the system's technical features based on the ISO 25010 software standards. The primary goal of the assessment was to provide valuable feedback to the development team, enabling them to improve the system's overall performance and reliability. The section also discussed the process of assessing the technical features of the system and highlighted the significant role of IT experts in this process. The assessment results are presented in Table 3.

Table 3 presents the results of the assessment conducted by IT experts on the technical features of the system. The table shows the mean scores and verbal interpretation of each software criteria evaluated, as well as the computed mean for the total assessment.

Table 3. Assessment on the Technical Features of the System by the IT Experts

Software Criteria	Mean	Verbal Interpretation
Functional Suitability	3.16	Functional
Performance Efficiency	3.27	Very Efficient
Compatibility	3.35	Very Compatible
Usability	3.40	Very Usable
Reliability	3.40	Very Reliable
Security	3.35	Very Secured
Maintainability	3.30	Very Maintainable
Portability	3.33	Very Portable
Total	**3.37**	**Very Acceptable**

The table reveals that the software system performed moderately well in terms of Functional Suitability, with a mean score of 3.16, which is considered functional. On the other hand, the system demonstrated very efficient Performance Efficiency, as indicated by a mean score of 3.27. The software system also scored highly in Compatibility, Usability, Reliability, and Security, with mean scores of 3.35 and 3.40, respectively. Additionally, the system showed very maintainable and very portable technical features, as indicated by mean scores of 3.30 and 3.33, respectively. Overall, the system received a mean score of 3.37, which is considered very acceptable.

The results of the assessment indicate that the software system has generally performed well in terms of its technical features, with most of the criteria receiving high mean scores. The system's performance has been demonstrated to be highly efficient and functionally suitable, while also being compatible, reliable, secure, maintainable, and portable. These results suggest that the system can provide users with a satisfying and reliable experience, with minimal risks of technical issues or glitches.

The high mean scores in the assessment also imply that the researchers has successfully achieved their goals in creating a functional and reliable software system. The team can use the feedback from the assessment to further improve the system's technical features, especially those with lower mean scores, and

ensure that it continues to meet the users' needs and demands.

The Assessment on the Quality of Using the System by the End-Users

The main focus of this section was to evaluate the system's quality based on feedback from end-users, which was crucial to assess its performance and functionality. This assessment aimed to gather valuable insights into how the system was being used, identify areas for improvement, and ensure that it met the needs and expectations of the users. The techniques utilized to assess the system's quality by end-users included usability testing, surveys, and interviews. Regular gathering of feedback from the end-users was important as it provided researchers with vital information to enhance the system's overall performance and effectiveness. By doing so, the researchers could continuously improve the system, ensuring its relevance and usefulness over time.

Table 4. Assessment on the Quality of Using the System by the End-Users

Software Criteria	Mean	Verbal Interpretation
Functional Suitability	3.16	Functional
Reliability	3.40	Very Reliable
Usability	3.26	Very Usable
Total	**3.27**	**Very Acceptable**

The table 4 displays the evaluation of functional suitability, which indicates that the respondents agreed that the system could adapt to various hardware, software, and other operating or use scenarios, with an overall grand mean of 3.16. According to Puspraningrum (2017), functionality is one of the quality factors that can be assessed by examining the connection between function and functional appropriateness. The respondents proposed that Project Learn should include a few additional options to meet all user needs and expectations, despite rating its given function highly promising with a mean of 3.16. The list of quality attributes outlines what a software product should have to fulfil the demands and desires of its users,

ensuring that the system provides the best possible services.

Additionally, table 4 showed a mean of 3.40 for reliability, which indicated a "very reliable" response in the survey. This suggested that the system made it easier for users to accomplish their assigned tasks and goals regularly. The approach used by Chae and Clark (1986) for calculating system reliability involved estimating the system's reliability from component reliabilities assuming statistically independent components. They compared the dependability of a system with statistically independent components to a system with common-cause failures and presented various examples to illustrate the method. In the reliability evaluation, respondents strongly agreed on the system's dependability, particularly in terms of recoverability when regularly backed up. Respondents recommended that the system should be more detailed and include additional information from teachers to make it easier to identify user qualifications.

Lastly, the table above shows the evaluation of "usability," indicating a computed mean of 3.40, which translates to "very usable" and capabilities to accomplish their goals within a certain usage context, thus giving them greater control. According to Dubey and Rana (2010), usability is a critical component of software system quality, and defining a clear and consistent definition of usability is necessary to develop quality systems. Although researchers have yet to develop a model that properly defines usability and all its characteristics, respondents lauded the system's graphical user interface and usability in terms of "usability." They also suggested adding a feature to the system that would allow both teachers and students to add files. Usability can be examined from various angles, and it requires a multifaceted approach to ensure that software systems are of high quality.

Based on the assessment conducted, the researchers found that the system's quality was highly approved by the respondents, as evidenced by the high computed mean score. This result suggests that the system effectively met the expectations and needs of the users, indicating that it was efficient, functional, and reliable. Such positive feedback from the respondents is essential as it validates the system's usability and reinforces its relevance in meeting its intended purpose. This finding could be beneficial in improving the system further, ensuring its continuous relevance and usefulness in the future.

Conclusion and Recommendations

Based on the findings of the study, the researchers concluded that Project Learn was viewed as user-friendly by the respondents and that students found the system to be useful and necessary. Both experts and end-users were satisfied with the system's performance, and the feedback received from end-users was utilized to improve the system's overall performance. The tutor finder system project was developed through the SDLC phases, including planning, defining requirements, design and prototyping, software development, testing, deployment, and operation and maintenance. The IT experts assessed the system based on the 25010 criteria, and end-users evaluated the system's functional suitability, reliability, and usability. The project passed both the technical and quality of use assessments, proving to be beneficial to end-users. The researchers incorporated some of the respondents' comments and suggestions, which contributed to the improvement of the system's overall performance.

Based on the conclusions drawn from the assessment of the tutor finder system, the researchers recommend implementing the following actions:

1.   Continue gathering feedback from end-users regularly to ensure the system remains relevant and useful over time.

2.   Act on the comments and suggestions given by end-users to improve the system's overall performance.

3.   Consider implementing additional features or improvements based on the feedback received to enhance the user experience further.

4. Continue conducting regular technical quality assessments to ensure the system meets the ISO 25010 software standards.

5. Use the software development life cycle (SDLC) as a framework for future system development projects to ensure a systematic approach to software development.

Acknowledgement

Conflict of interests

The researchers declares no conflict of interest.

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