Connecting Tutors and Students: A Mobile Application Designed with Design Thinking

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Abstract

The rapid advancement of information technology has transformed education globally, but in regions like Manado, Indonesia, the lack of platforms connecting private tutors with students creates inefficiencies. Students face difficulties in finding affordable tutoring services, while tutors struggle with marketing and building trust. This study aims to design and evaluate the user interface (UI) and user experience (UX) of a mobile application addressing these challenges using the Design Thinking methodology. Through five stages—Empathize, Define, Ideate, Prototype, and Test—key pain points were identified, including scheduling inefficiencies, trust issues, and geographical constraints. Solutions like flexible scheduling, integrated promotional tools, and rating systems were proposed. Prototypes, developed using Figma, were tested through usability evaluations across four scenarios. Key findings include: Scenario 3 (notifying a tutor) showed optimal performance with a task completion time of 2 seconds, no miss-clicks, and a usability score of 100; Scenario 1 (finding courses via maps) had a 95 usability score with an 8% miss-click rate; Scenario 2 (finding schedules) showed a 25% miss-click rate and a usability score of 80; and Scenario 4 (checking notifications) faced significant challenges, with a 50% miss-click rate and a usability score of 75. These results underscore the effectiveness of Design Thinking in addressing the needs of users and provide valuable insights for improving educational platforms in underserved regions. The findings suggest that while the mobile app holds great potential for improving educational access, further refinements are needed, particularly in navigation and notification features.

Keywords—Design Thinking, Mobile Application, User Interface, User Experience, Prototype Testing

1. INTRODUCTION

The rapid development of information technology has transformed various aspects of daily life, including education [1]. The demand for supplementary education, such as private tutoring, is growing worldwide, and mobile applications have emerged as vital tools in bridging the gap between tutors and students [2]. However, in regions such as Manado, Indonesia, the availability and accessibility of platforms that connect private tutors with students are still limited. This results in inefficiencies within the private tutoring market, where students struggle to find affordable tutoring services nearby, and tutors face challenges in reaching potential students. These barriers hinder access to quality educational services and create a gap in the market for effective platforms that could alleviate these issues [3].

1.1. Literature Review

Several studies have explored educational platform designs, particularly emphasizing location-based tutor search systems as a way to bridge the gap between tutors and students. For example, research conducted in Jakarta demonstrated that integrating location-based services into mobile applications significantly reduced the time required for students to find suitable tutors in

their vicinity [1]. This functionality is especially important in urban areas, where physical proximity and the ability to search within a specific geographic radius are critical factors for adoption. By enabling users to filter results based on location, these platforms address one of the primary challenges of connecting tutors and students, making the search process more efficient and user-friendly.

In addition to location-based features, the role of user interface (UI) and user experience (UX) design in the success of educational platforms has been widely acknowledged. An effective UI/UX design ensures that applications are intuitive, visually appealing, and easy to navigate, ultimately enhancing user engagement and satisfaction. A study by Haryuda Putra et al. (2021) highlighted the transformative impact of good UI/UX design in improving the usability of educational applications. The study found that apps with minimalistic and structured layouts not only simplified the navigation process but also reduced cognitive load for users, allowing them to focus on the learning content rather than struggling with the app's interface [2].

Moreover, the incorporation of interactive elements, such as chat features, dashboards, and progress tracking, has been shown to boost user retention by creating a more immersive and personalized experience [4]. Applications that effectively combine functional and aesthetic elements, such as "Edmodo" and "ClassDojo," serve as successful examples of how UI/UX design can create platforms that cater to diverse user needs. These designs emphasize clarity, accessibility, and ease of use, ensuring that users from varying levels of digital literacy can comfortably engage with the platform.

1.2. Research Gap and Objective

While significant advancements have been made in educational technology, most existing solutions are designed for urbanized and well-resourced regions, leaving underserved areas like Manado, Indonesia, without adequate tools to connect private tutors with students. Research has shown that mobile applications for education have been effective in addressing issues such as geographic barriers and scheduling inefficiencies [5]. However, these platforms often fail to consider the unique socio-economic and cultural challenges present in regions like Manado, where access to affordable tutoring services remains limited, and trust between tutors and students is difficult to establish.

From the students' perspective, the primary challenges include finding nearby, affordable tutoring services that align with their academic needs. On the other hand, tutors face significant hurdles in marketing their services to potential clients and building a reputation in the community, which affects their ability to attract and retain students. These challenges result in inefficiencies within the private tutoring market, restricting access to quality education and exacerbating educational inequality in underserved areas [6]. These challenges lead to inefficiencies in the market, which can impact the quality of education and limit opportunities for learners in these underserved areas.

This study addresses these gaps by designing and evaluating the user interface (UI) and user experience (UX) of PriLearn, a mobile application tailored specifically to the needs of the Manado community. By employing the Design Thinking methodology, this research takes a user-centered approach to identify pain points and iteratively develop solutions that prioritize usability, trust-building, and affordability. Unlike existing platforms, PriLearn integrates features such as location-based tutor search, flexible scheduling systems, and rating mechanisms, which are customized to address the challenges specific to this region [7], [8]. Design Thinking consists of five stages: Empathize, Define, Ideate, Prototype, and Test. These stages allow designers to deeply understand the user's challenges, develop ideas to solve them, and test solutions with real users. The method's focus on user empathy and iterative prototyping makes it an ideal approach for creating applications that prioritize user needs and experiences. The research follows a comprehensive process [9]: the first stage, Empathize, involves gathering insights into user needs through direct interviews with both tutors and students. In the Define stage, the challenges identified are analyzed to create user personas and journey maps, which guide the design process.

The Ideate phase focuses on brainstorming potential solutions, and in the Prototype stage, the design ideas are transformed into wireframes and tested with real users to gather feedback. Finally, the Test phase evaluates the prototypes' effectiveness through usability testing. The research contributes to improving access to private tutoring services in Manado and provides insights for developing similar applications in other parts of Indonesia [10], [11], [12].

The necessity of this study lies in its dual contribution. First, it provides a practical solution to the challenges faced by both tutors and students in Manado, thereby improving access to supplementary education in the region. Second, it offers a scalable framework for designing similar applications in other underserved areas of Indonesia and beyond. By explicitly focusing on the unique needs of an underserved market, this research fills a critical gap in the literature and contributes to the broader understanding of how educational platforms can be adapted to diverse contexts [13].

2. RESEARCH METHODS

This research adopts the Design Thinking methodology to design the user interface (UI) and user experience (UX) for the PriLearn mobile application. Design Thinking was chosen because it offers a user-centered approach, which closely aligns with the research objectives of understanding and addressing the specific challenges faced by tutors and students in Manado. Unlike other methodologies, such as Agile or traditional system development lifecycles, Design Thinking emphasizes empathy and iterative prototyping, making it particularly suitable for addressing complex, user-driven problems in a context-specific manner. The decision to use Design Thinking is justified by its strong alignment with the research objectives. The primary aim of this study is to develop a solution that effectively meets the needs of private tutors and students in an underserved region. Design Thinking ensures that the voices of these users are central to the design process through its emphasis on empathy and user engagement. This is especially critical in Manado, where socio-economic and cultural factors significantly influence user behavior and expectations. In addition, Design Thinking's focus on user-centered innovation differentiates it from other methodologies, such as Lean or Agile, which may prioritize speed or efficiency over deep user insights. The methodology fosters ideation and prototyping based on actual user feedback, which is essential for developing tailored features like location-based tutor search, trust-building mechanisms, and affordability-focused solutions [10], [11], [12].

The methodology is structured around five stages: Empathize, Define, Ideate, Prototype, and Test as shown in Figure 1 below. The steps outlined below provide a detailed overview of the research process:

Figure 1. Design Thinking Process

2.1. Empathize

In the first stage, the goal was to understand the users' needs and challenges by gathering qualitative data through interviews with potential users. The participants in the study were private tutors and students in Manado, as they are the primary stakeholders of the PriLearn application. A set of interview questions was designed to uncover the difficulties faced by tutors in reaching students and the challenges students encounter when searching for affordable tutoring services. The data collected during this phase was used to develop journey maps, which were essential in guiding the design process [14].

2.2. Define

The Define phase involves synthesizing the data collected in the Empathize phase to clearly articulate the key problems that need to be addressed. Based on the insights from the

interviews, the research identified pain points such as difficulty in scheduling sessions, trust issues between students and tutors, and limited access to tutors due to geographical constraints. To organize these findings, user journey maps were created to illustrate the experience of both tutors and students throughout their interactions with tutoring services. These maps helped pinpoint critical stages where users encountered frustration or inefficiencies [15].

2.3. Ideate

In the Ideate phase, the focus shifted to brainstorming solutions to the problems identified during the Define stage. The goal was to come up with a wide range of ideas that could address the pain points and improve the overall user experience. This stage involved creating an information architecture that would structure the application in a way that made it easy for users to navigate and fulfill their needs. Solutions such as flexible scheduling systems, integrated promotional tools for tutors, and personalized course recommendations were developed. The research also focused on creating a dynamic course template to assist tutors in designing engaging and customizable lesson plans [16].

2.4. Prototype

The Prototype phase involved turning the best ideas from the Ideate stage into tangible designs. In this stage, interactive prototypes were created to visualize the application's layout and flow. These prototypes were developed using Figma, allowing for a more realistic simulation of how the final application would function. These prototypes were developed for both tutor and student interfaces, ensuring that both user groups' needs were addressed effectively. The prototypes focused on key features such as an intuitive course search, real-time tutor availability, and communication tools [17].

2.5. Test

The final stage, the Test, involved conducting usability testing with real users. The prototypes were presented to a group of tutors and students who were asked to complete tasks based on typical user scenarios, such as registering for a course, scheduling a session, and providing feedback. The results were analyzed using various usability metrics, including average task completion time, miss-click rates, and usability scores. For scenario usability score, is calculated using equation (1) below:

$$x = DSR + \left(\frac{IDSR}{2}\right) - avg(MCP) - avg(DUP) \quad (1)$$

where, DSR for Direct Success Rate
$IDSR$ for Indirect Success Rate
avg for the average
MC_P for misclick penalty $= MCR * 0.5$
MCR for misclick rate
DU_P for duration penalty $= (MIN(10, MAX(0, (AVGD - 5)/2)))$
$AVGD$ for Average Duration in seconds

To measure the overall usability of the application, the Overall Usability Score (OUS) was calculated as the average of all SUS scores across the scenarios using the equation (2) below:

$$y = avg(x) \quad (2)$$

The testing phase provided valuable feedback that allowed the design team to refine the application's interface, improve navigation, and enhance the overall user experience [18].

Through this iterative process, the research aimed to create a UI/UX design that was not only functional but also intuitive and user-friendly. The use of Design Thinking ensured that the application's features were closely aligned with the users' needs, providing a solution that could effectively address the challenges faced by both tutors and students in the private tutoring market.

3. RESULT AND DISCUSSION

In this section, the results of the research are presented alongside a detailed discussion. The study focused on designing the user interface (UI) and user experience (UX) of the PriLearn mobile application for connecting private tutors with students in Manado [19], [20], [21]. The iterative process of Design Thinking allowed for the identification of key user needs, followed by the creation of solutions aimed at enhancing the user experience.

3.1. Empathize Phase Results

The Empathize phase provided valuable insights into the challenges faced by both tutors and students in Manado. Through interviews, the research uncovered several key pain points:

- Students often struggled to find affordable, nearby tutors, with limited platforms to compare options.
- Tutors found it difficult to reach new students, relying heavily on word-of-mouth and social media, which limited their visibility and growth opportunities.
- Both students and tutors expressed concerns about trust issues and the lack of a reliable platform for secure communication and scheduling.

From these insights, journey maps were created to better understand the characteristics and motivations of different user groups; and to visualize the emotional and functional needs of the users, focusing on their thoughts, feelings, actions, and challenges when engaging with tutoring service.

3.2. Define Phase Results

The Define phase synthesized the findings from the Empathize stage, leading to the creation of user journey maps for both tutors and students which produce the paint points. These highlighted critical pain points where users encountered frustration, as shown in Figures 2 and 3 respectively.

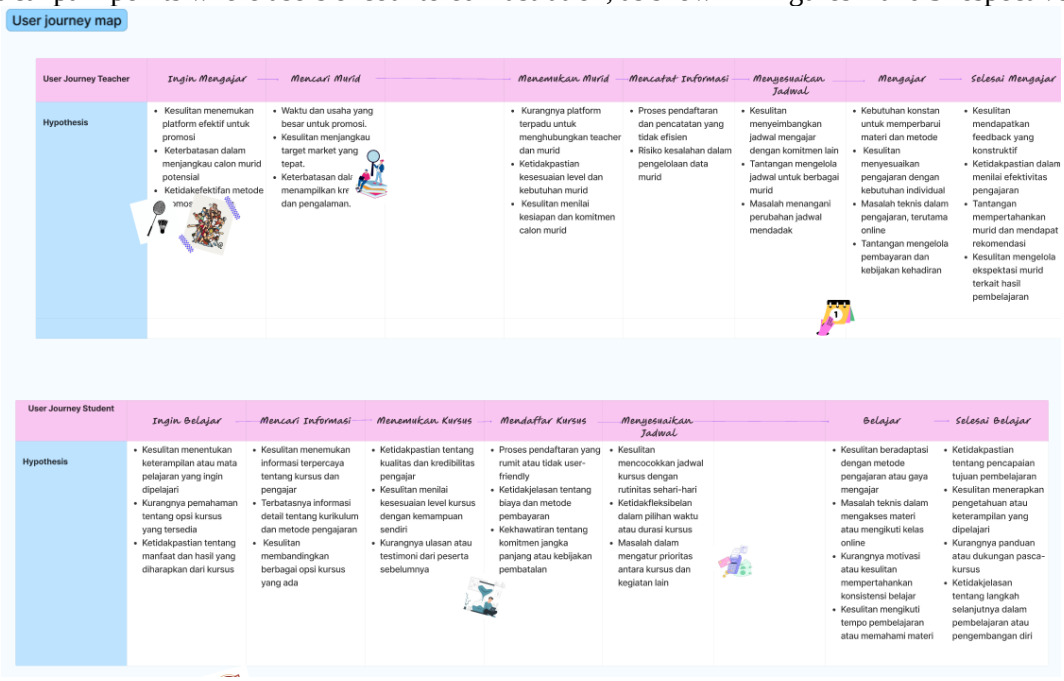

Figure 2. User Journey Map

Figure 3. Teacher's and Student's Pain Point

Identifying these pain points allowed for a clearer understanding of the users' expectations, which guided the design of solutions in the subsequent stages.

As shown in Figures 4 and 5, the prioritization of solutions in the Ideate phase was guided by the "How Might We" (HMW) questions, which were derived from the pain points identified during the Empathize and Define phases. From the teacher's perspective, the solutions were prioritized based on their potential to address challenges like enrollment continuity, course management, and teaching quality effectively. For instance, the student enrollment dashboard and notification system were prioritized for their ability to directly resolve uncertainties in student enrollment. Similarly, dynamic course templates and content management tools were chosen to improve course preparation and ensure ongoing engagement. Other solutions, such as teaching evaluation systems and flexible scheduling systems, were selected for their relevance in addressing teaching quality and efficiency, ensuring that the most pressing teacher needs were met first.

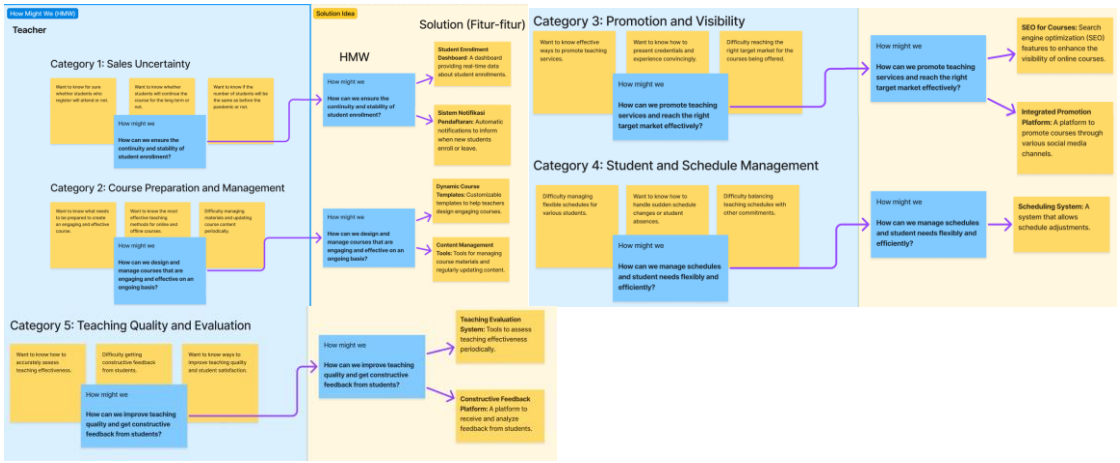

Figure 4 & 5. Teacher's HMW to Solution(features) – Category 1 - 5

On the other hand, Figures 6 and 7 show from the student's perspective. The prioritization process focused on solutions that addressed uncertainty in course selection, quality, and accessibility. Personalized course recommendations and detailed teacher profiles were prioritized as they directly support students in making informed decisions about courses and instructors. Flexible calendars and course comparison features were chosen for their impact on improving scheduling and course selection processes. Solutions like learning portfolios and course value reviews were selected to enhance transparency and showcase the value of courses to students. Each solution was evaluated for its feasibility, alignment with user needs, and potential to provide the greatest impact, ensuring a structured and user-centered prioritization process.

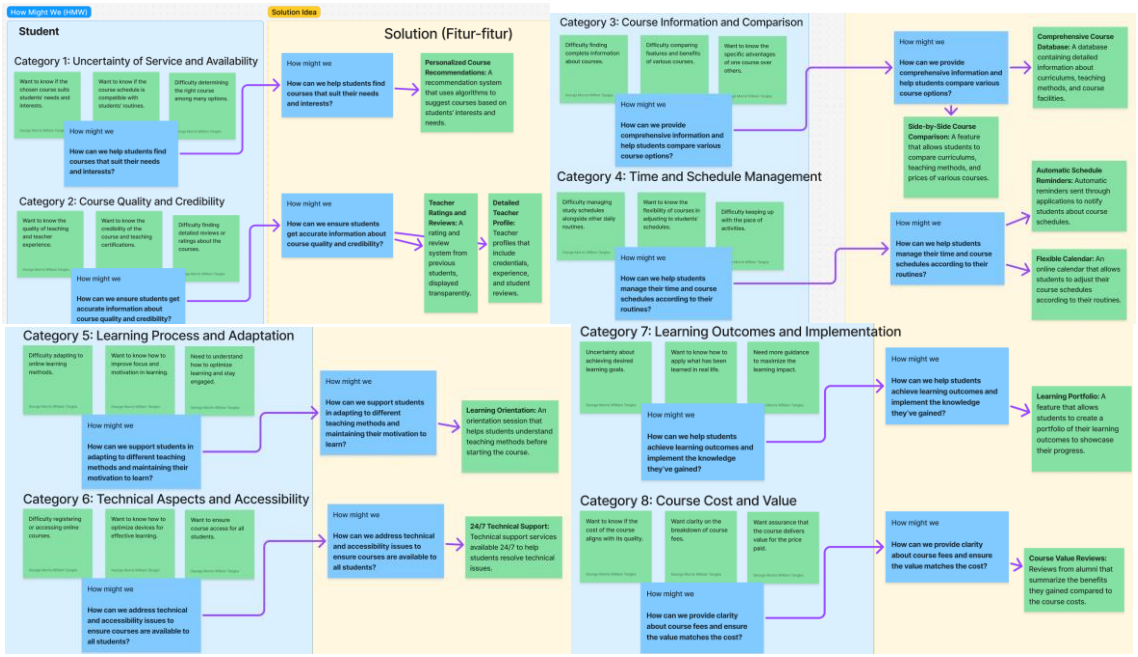

Figure 6 &7. Teacher's HMW to Solution(features) – Category 1-8

3.3. Ideate Phase Results

During the ideate phase, multiple solutions were proposed to address the identified pain points. The solutions aimed to improve the efficiency and effectiveness of the tutoring process. The analysis of PriLearn mobile application issues is shown in the table below:

Table 1. Analysis of PriLearn Mobile Application Issues and Solution

No.	Problem	Solution
1	The continuity and stability of student registration cannot be assured.	Implement a student registration dashboard that provides real-time data and an automatic notification system to inform about changes in registration status, both for new registrations and cancellations.
2	The design and management of engaging and sustainable courses are not optimal.	Develop an integrated promotion platform to promote courses through various social media channels, along with SEO features for courses to increase online visibility.
3	Promotion of teaching services and targeting the right market is ineffective.	Promotion of teaching services and targeting the right market is ineffective.
4	Scheduling management and student needs are not flexible and efficient.	Implement a flexible scheduling system that allows easy adjustments to schedules.
5	Teaching quality is not optimal, and constructive feedback from students is inadequate.	Implement a teaching evaluation system that provides tools for assessing teaching effectiveness periodically, as well as a platform for receiving and analyzing constructive feedback from students.
6	Assisting students in choosing courses that meet their needs and interests is not optimized.	Provide personalized course recommendations using algorithms to suggest courses based on student interests and needs.
7	Ensuring that students receive accurate information about the quality and credibility of courses is not optimal.	Provide a rating and review system for teachers that displays ratings and reviews from previous students transparently, as well as a detailed teacher profile that includes credentials, experience, and student reviews.
8	The way to provide complete information and help students compare different course options is not optimally implemented.	Provide a side-by-side course comparison feature that allows students to compare curriculums, teaching methods, and prices of various courses, as well as a course information database containing comprehensive details about the curriculum, teaching methods, and course facilities.
9	The way to help students manage their time and course schedule to match their routines needs improvement.	Provide an online flexible calendar for students to adjust their course schedules to match their routines, along with automatic reminders through the app to remind students of their course schedules.
10	The way to support students in adapting to teaching methods and maintaining learning motivation needs to be strengthened.	Organize orientation sessions to help students understand the teaching methods before starting the course.
11	The way to resolve technical issues and ensure course accessibility for all students needs improvement.	Provide 24/7 technical support services to help students address technical issues.
12	Efforts to actively assist students in achieving learning goals and applying the knowledge they have learned must be enhanced.	Provide a learning portfolio feature that allows students to create and showcase their learning progress.
13	Efforts to provide transparency about course costs and ensure that the value obtained matches the cost need to be improved.	Display reviews from alumni that include the benefits they gained compared to the course costs.

These ideas were captured in the information architecture, which structured the app to ensure an intuitive navigation flow. The goal was to create an application that was not only functional but also engaging and easy to use.

3.4. Prototyping Phase Results

The Prototype phase led to the creation of wireframes and interactive prototypes using Figma. The prototypes were designed for both students and tutors, and an opening session focusing on simplicity and usability, respectively shown in Figures 8, 9, and 10.

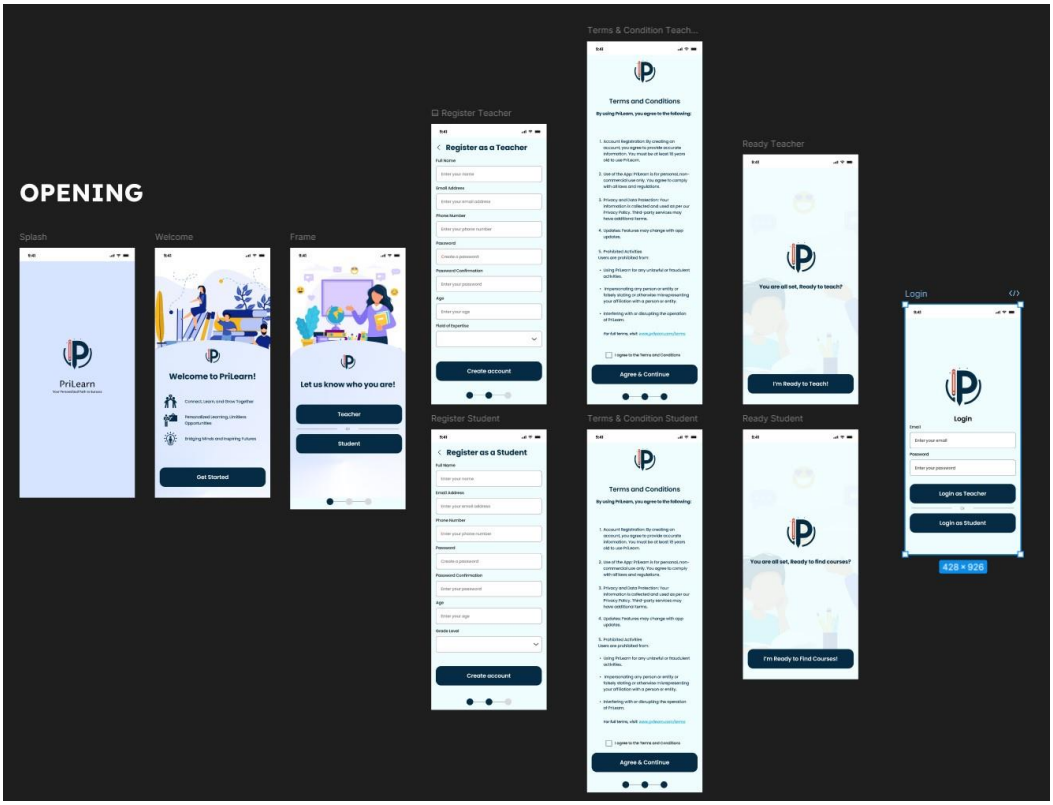

Figure 8. Opening Prototype

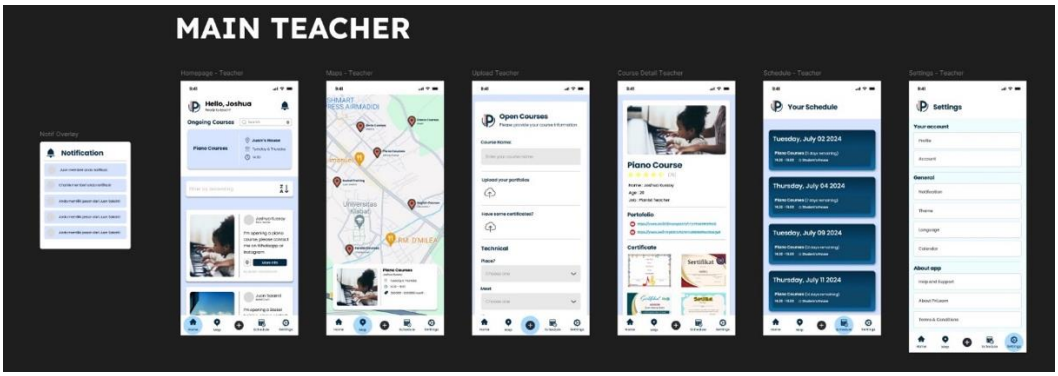

Figure 9. Teacher's Prototype

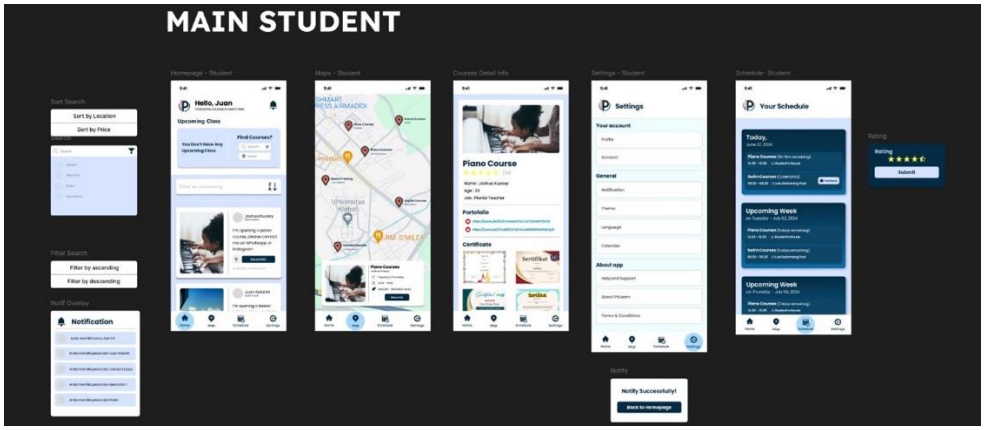

Figure 10. Student's Prototype

3.5. Test Phase Results

The test phase involved conducting usability testing on the prototypes with actual users (both tutors and students). The testing focused on specific tasks:

3.5.1 Scenario 1: Maps to Find Courses

In this scenario, users were tasked with navigating to the maps feature to find courses near them. The results for this scenario showed a positive but mixed performance across key usability metrics. Figure 11 shows the result for scenario 1. The average time taken by users to complete the task was 8 seconds, which is relatively efficient for finding nearby courses. However, the miss-click rate was 8%, which indicates some minor confusion or misclicks as users interacted with the map feature. The usability score for this scenario was 95, reflecting a high level of user satisfaction and overall ease of use. Despite the low miss-click rate, further analysis revealed that some areas of the map navigation could benefit from improved guidance to reduce any possible errors.

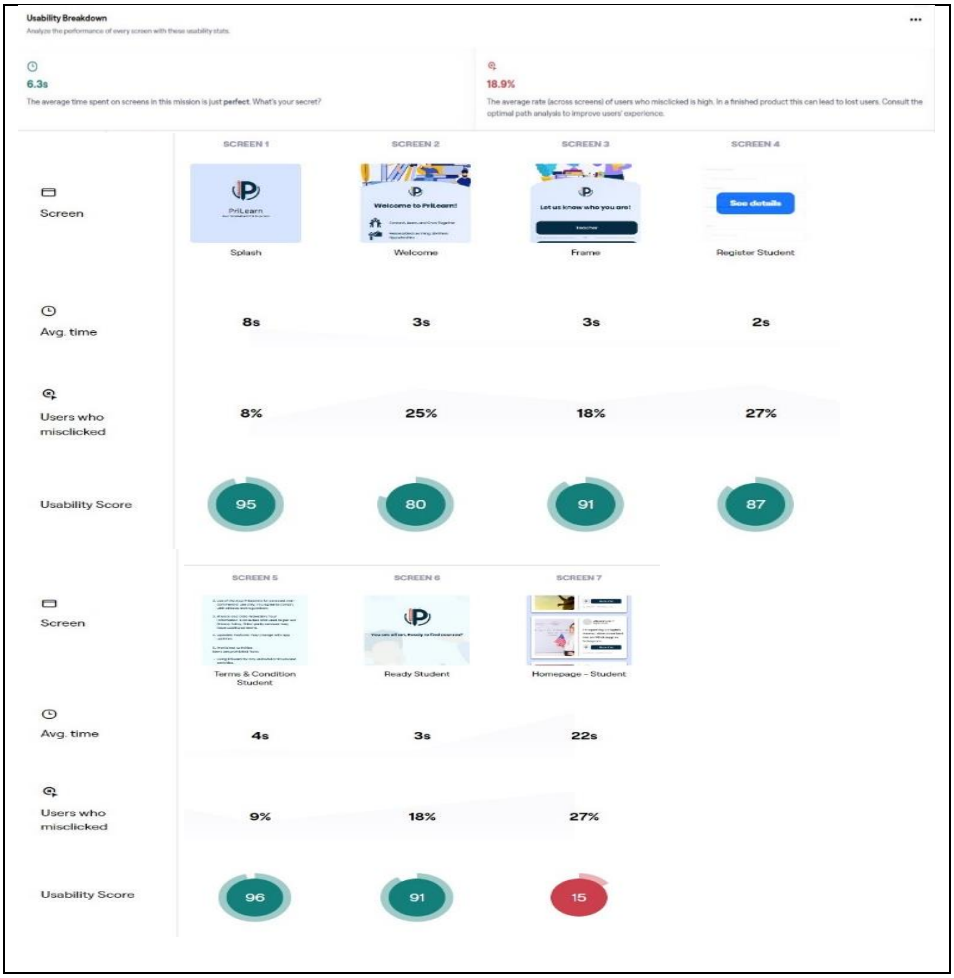

Figure 11. Average Time, Miss Click Rate, and Usability Score for Scenario 1

3.5.2 Scenario 2: Find Your Schedule

In Scenario 2, users were tasked with finding their schedules after registering as students and applying for courses. The goal was to assess how easily users could access and view their schedules within the app. Figure 12 shows the result for scenario 2. The average time spent on this task was 3 seconds, which indicates that most users were able to quickly find their schedule, suggesting that the app's navigation is relatively intuitive for this particular feature. The miss-

click rate was 25%, which is slightly higher than in Scenario 1. This could indicate some confusion when navigating between screens or possibly difficulty in locating the schedule feature, especially if the interface is not clear enough. However, the usability score for this scenario was 80, which suggests that users found the overall process functional but with room for improvement, particularly in guiding users to their schedules with minimal errors.

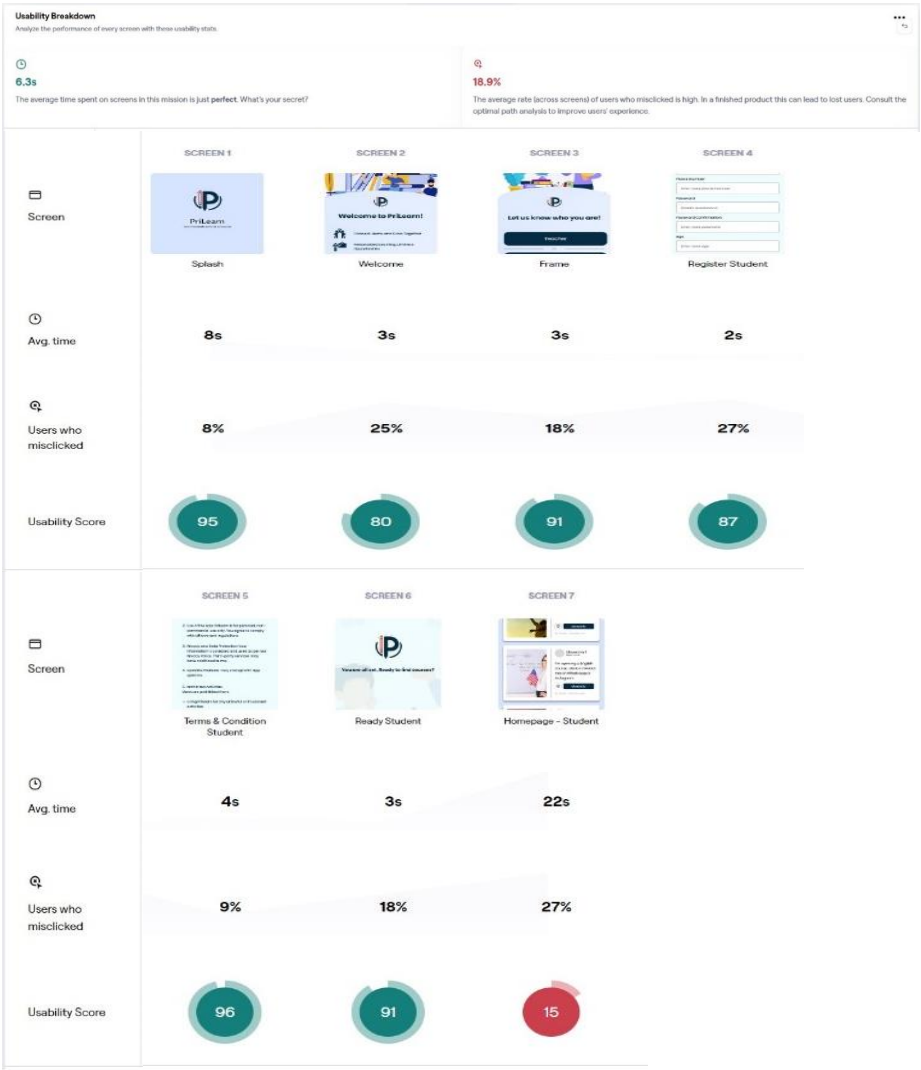

Figure 12. Average Time, Miss Click Rate, and Usability Score for Scenario 2

3.5.3 Notify the 'Piano' Teacher

In Scenario 3, users (registered as students) were tasked with notifying a piano teacher after selecting a piano course. The objective was to determine how easily students could notify teachers and whether the process was intuitive. Figure 13 shows the result for scenario 3. The average time spent on this task was 2 seconds, which suggests that most users could complete the task very quickly. This indicates that the flow for notifying the teacher was straightforward and efficient. The miss-click rate was 0%, which is highly encouraging as it suggests that users did not make any errors while interacting with the app during this scenario. This is a positive outcome, reflecting that the UI was clear and users understood the steps to notify the teacher. The usability score for this scenario was 100, the highest possible score, indicating that users were very satisfied

with this feature. This suggests that the design and workflow for notifying the teacher were highly intuitive and effective.

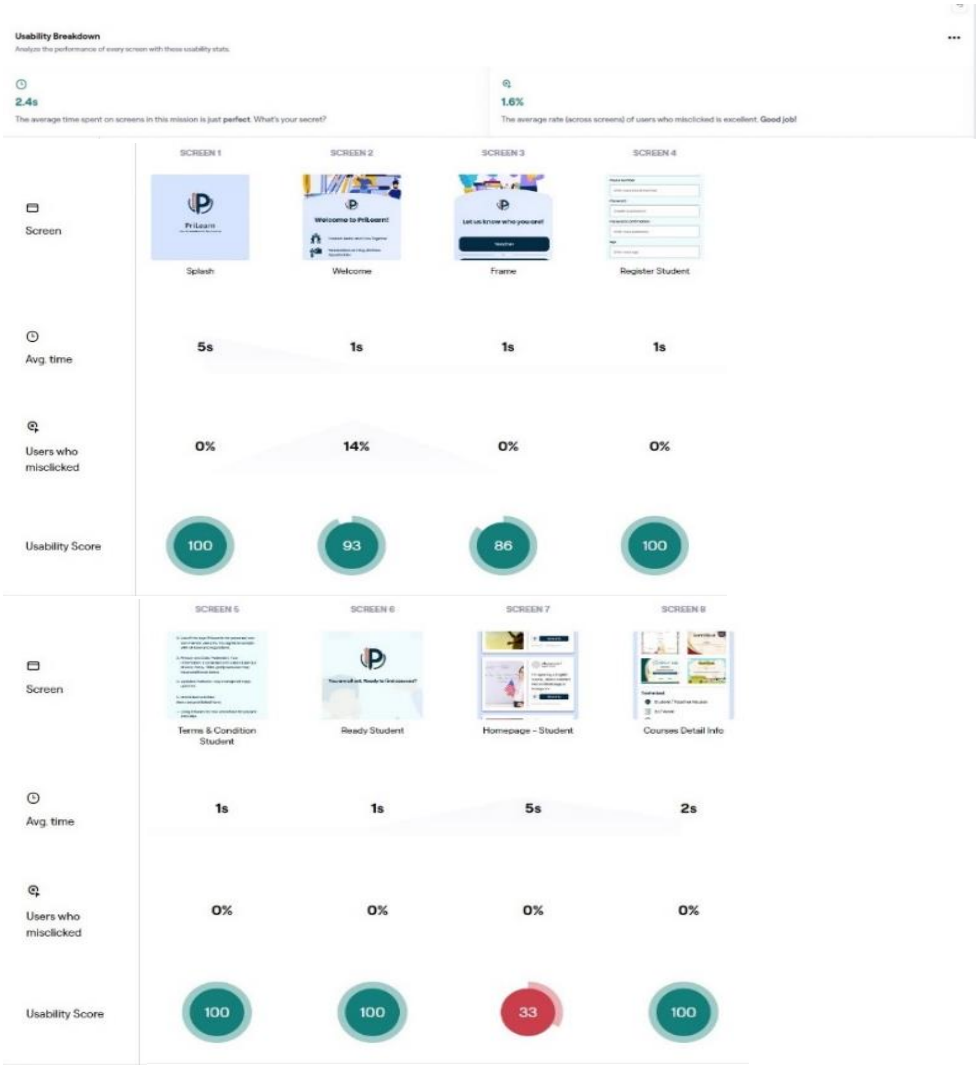

Figure 13. Average Time, Miss Click Rate, and Usability Score for Scenario 3

3.5.4 Scenario 4: Providing Feedback and Rating

In Scenario 4, users (registered as teachers) were tasked with checking and responding to notifications from students. The goal was to evaluate how easily teachers could find and manage their notifications within the app. Figure 14 shows the results for scenario 4. The average time spent on this task was 5 seconds, showing that users could quickly locate and review notifications. However, the miss-click rate was 50%, which is significantly higher compared to the other scenarios. This high miss-click rate suggests that users had difficulty navigating to the notification section or might have interacted with other parts of the interface unintentionally. This issue could indicate that the notification feature was not as easily accessible or marked as needed. Despite the higher miss-click rate, the usability score for this scenario was 75, which indicates that while the feature was usable, there were some difficulties in terms of navigation or feature prominence.

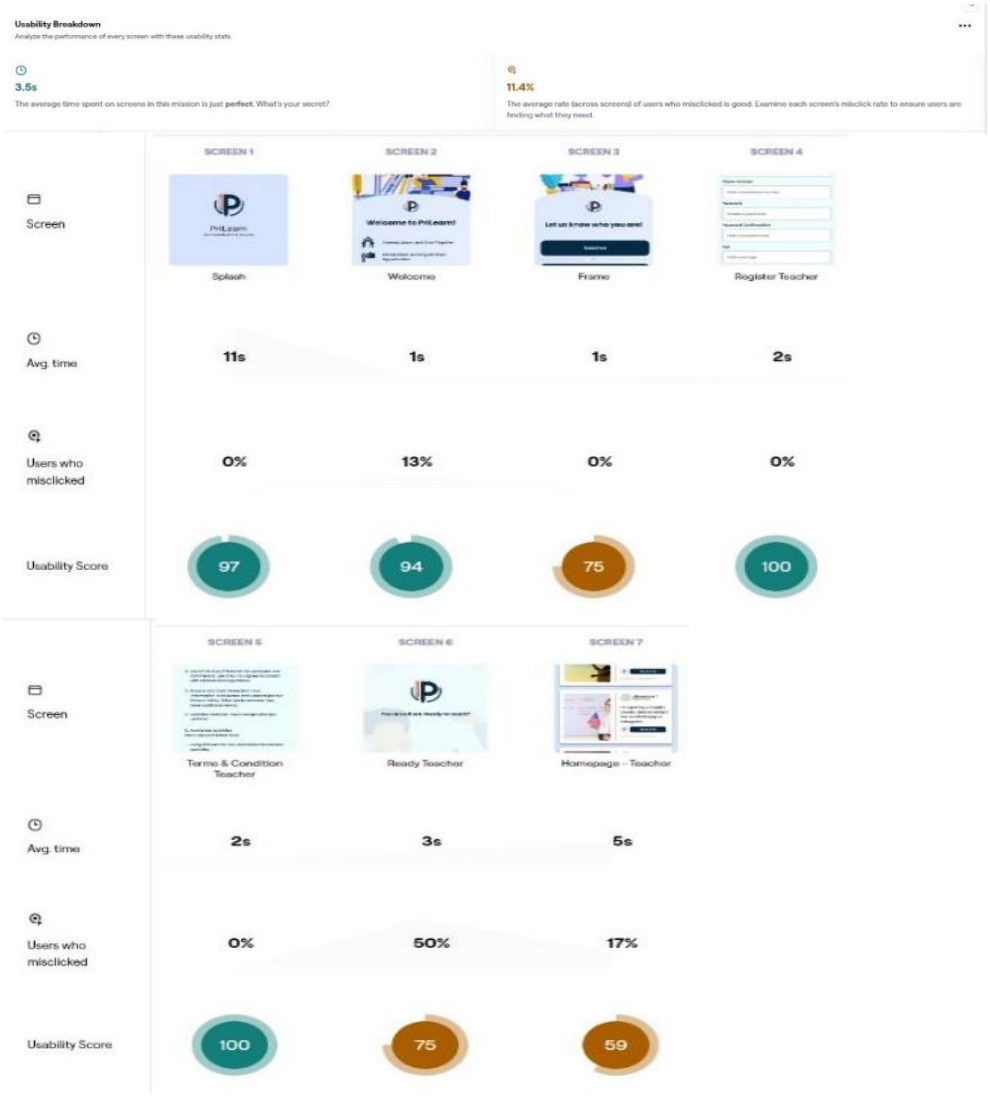

Figure 14. Average Time, Miss Click Rate, and Usability Score for Scenario 4

4. CONCLUSION

This study aimed to evaluate and improve the UI/UX design of the PriLearn mobile application using the Design Thinking methodology. The research focused on four key scenarios: finding courses via maps, viewing schedules, notifying teachers, and checking notifications. Usability testing revealed that the app successfully meets user needs in most tasks, with Scenario 3 ("Notify the piano teacher") achieving excellent results. However, Scenario 1 ("Maps to find courses") and Scenario 2 ("Find your schedule") showed areas for improvement, particularly in navigation clarity and user guidance. Scenario 4 ("Notifications") also highlighted the need for better feature visibility.

In Scenario 1 ("Maps to find courses"), users completed the task in an average of 8 seconds with a miss-click rate of 8% and a usability score of 95. While users were generally able to navigate the map effectively, the results suggested room for improvement, particularly in reducing confusion during the map interaction. Scenario 2 ("Find your schedule") showed that users could find their schedule in 3 seconds on average, with a miss-click rate of 25% and a usability score of 80. Despite the quick task completion, the higher miss-click rate indicated some difficulty in navigating to the schedule feature, suggesting that greater prominence and clearer instructions would enhance the user experience. In Scenario 3 ("Notify the piano teacher"), the

task was completed in just 2 seconds, with no miss-clicks (0%) and a perfect usability score of 100. Scenario 4 ("Notifications") showed mixed results, with an average task completion time of 5 seconds and a miss-click rate of 50%. This high miss-click rate, coupled with a usability score of 75, indicated that users had difficulty locating the notification feature. The overall usability score was 87.5, indicating strong but improvable usability across the scenarios. This score highlights the need to address specific user pain points, particularly in Scenarios 1, 2, and 4, to further enhance the application's overall performance.

Overall, the study demonstrates that the Design Thinking approach effectively identified areas where the PriLearn app performed well and where improvements were needed. While Scenario 3 achieved excellent results, Scenarios 1, 2, and 4 highlighted opportunities for enhancing navigation clarity, improving feature visibility, and reducing user errors. These findings underscore the importance of iterative design and feedback in creating a user-centered experience. By addressing these pain points, the app's usability can be significantly improved, leading to a more efficient and satisfying user experience.

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