

**Parent-teacher Association (PTA) Mobile Application as Communication Tool to Enhance
Communication Among PTA Members**

by

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19000420

Dissertation submitted in partial fulfilment of the requirements of

Faculty of Science and Information Technology

Bachelor of Information Technology (Hons)

MAY 2023

Universiti Teknologi PETRONAS
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CERTIFICATION OF APPROVAL

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Communication Among PTA Members**

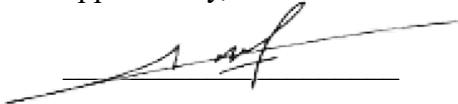
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A project dissertation submitted to the
Information Communication Technology Programme
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in partial fulfilment of the requirement for the
BACHELOR OF TECHNOLOGY (Hons)
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Approved by,



(Associate Professor Dr Izzatdin B A Aziz)

UNIVERSITI TEKNOLOGI PETRONAS

SERI ISKANDAR, PERAK

MAY 2023

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

wuanlu

LIM WUAN LU

Abstract

Education plays a vital role in our daily lives as it shapes a brighter future for the next generation. To ensure active involvement in overseeing students' education, schools require a stronger platform for effective communication between teachers and parents. Unfortunately, parental oversight of their children's extracurricular activities and academic progress is currently insufficient due to time limitations and busy schedules. Moreover, teachers' instructions to parents often fail to be adequately conveyed, partly due to the challenges of clear communication caused by the teachers' young age. Additionally, the existing mechanisms for parental payments and donations, such as PIBG fees, pose inconveniences. Hence, this project proposes the development of a Parent-Teacher Association Application to facilitate seamless connectivity between parents and teachers, regardless of time and location. The application will be accessible through both web and mobile platforms and will feature five key functions: online payment, event reminders, announcements, student registration, and instant messaging. Qualitative research methodology will be employed, drawing data from case studies and research reports. The Agile methodology will be utilized for application development, ensuring frequent deliverables and reducing overall development time. In terms of future work, there are several avenues for enhancement and expansion of both the mobile application and web-based system. Firstly, additional functions can be incorporated to further enrich the user experience and functionality. This could involve features such as student timetables, examination result tracking, class arrangement management, and more. Secondly, conducting surveys to gather feedback and assess user satisfaction with the applications will be crucial. Based on the survey results, necessary improvements can be made to address any identified issues or areas for enhancement. Additionally, it is essential to delve deeper into the relationship between parents, students, and teachers. By understanding their unique dynamics and needs, the application can be customized to cater to specific requirements and foster better collaboration and communication among all stakeholders. This exploration will provide valuable insights for optimizing the development and usability of the application, ultimately improving the overall experience for parents, students, and teachers alike.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

The Parent-Teacher Association (PTA) serves as an official platform for teachers and parents within a school, with the shared goal of promoting the comprehensive development and well-being of the child. Effective collaboration between parents and teachers is crucial for the academic success of students. However, both parties often encounter challenges in communicating with each other. In today's fast-paced digital environment, traditional methods of communication, such as in-person meetings or paper-based communication, frequently prove to be ineffective and time-consuming.

Traditional modes of communication between schools and parents tend to be indirect as communication primarily relies on channels such as the student handbook, school announcements, and children's reports. In reality, parents rarely hear their children discussing school life on a regular basis. Most of the children hesitate to share what they have learned or what transpired in the classroom. Additionally, parents may worry about the reliability, faithfulness, and honesty of their children. Instances of children fabricating information, failing to deliver school announcements, forging parental signatures, or altering homework assignments further contribute to these concerns.

Face-to-face meetings and phone calls are also utilized for communication between parents and schools. However, these methods have limitations due to time constraints. Parents may have other family responsibilities, business trips, or demanding jobs that make it difficult for teachers to engage in direct conversations with them. Consequently, teachers often only approach parents when significant issues arise, such as cheating, disciplinary problems, or physical altercations with peers. Minor issues are often addressed during the annual Parent Day event, further delaying timely communication.

The PTA application intends to use technology to improve communication between parents and teachers by enabling real-time interaction, access to crucial information, and facilitation of cooperative efforts to assist students' overall development. The PTA system will be developed both

in web-based system and mobile application for teachers and parents respectively. The program gives parents and teachers flexibility and accessibility regardless of their location or time constraints by integrating web-based and mobile platforms.

The PTA application aims to address these issues by providing a user-friendly interface that facilitates seamless communication, collaboration, and information sharing between parents and teachers. The application's features include online payment capabilities, event reminders, announcements, student registration, and instant messaging. By centralizing these functionalities within a single platform, the application seeks to simplify and streamline the overall parent-teacher communication process.

With the utilization of this application, parents can swiftly access reliable and current information about their children's academic progress. Hence, the creation of a Parent-Teacher Association Application appears to be a workable solution to the demand for a more streamlined and practical method and has the potential to revolutionize how parents and teachers interact, ultimately leading to a more effective, efficient, and engaged educational ecosystem by leveraging technology and maximizing the advantages of an integrated mobile and web-based platform.

1.2 Problem Statement

One of the problem statements is that the lack of communication and information flow between schools and parents contributes to a decrease in parental participation in school events. Many parents are unaware of what is happening in their children's school lives, leading to reduced involvement in activities and events. This knowledge gap creates a barrier between parents and teachers, hindering effective collaboration and hindering children's educational progress. When parents are not actively engaged in school events, it becomes challenging to establish a supportive and cooperative relationship between home and school, ultimately affecting children's overall performance and well-being.

Besides, the mechanism to reach parents when comes to donation and payment to school are not well in place. Many parents express concerns about the safety of sending money to school, particularly for fees like the "PIBG fees". This is because parents are worried about their children are unable to keep the money safely to the school and hence, parents would delay the payment and affecting the overall functioning of the school.

Additionally, the lack of parental and teacher attention to student performance poses another challenge. With busy schedules and various commitments, some parents may forget to attend crucial events like Parents' Day. The absence of parents in these events has a negative impact on children, particularly those who feel left behind. This absence can result in lower cognitive and academic test scores for students. It is essential for both parents and teachers to prioritize regular communication and active involvement in monitoring and supporting students' academic progress, ensuring their success in school.

1.3 Objectives

- To recognise and evaluate the communication difficulties that PTA members face.
The requirements of the application can be identified by studying and analysing the barriers of communication among PTA members. This is to ensure the outcome of this project met the requirements and satisfaction of users.
- To design and develop a front-end PTA application that able to promote remote communication and activities in school.
After the requirements are identified, a wireframe and prototypes of the application are designed. Then, the application is developed in order to solve the problems as stated in section 1.2.
- To conduct User Acceptance Testing (UAT) on the developed mobile application and web-based system.

Once the application is developed, user acceptance is performed and validate according to the requirements. This is to ensure that the application is bug-free and able to deliver the outcome accurately.

1.4 Scope of Study

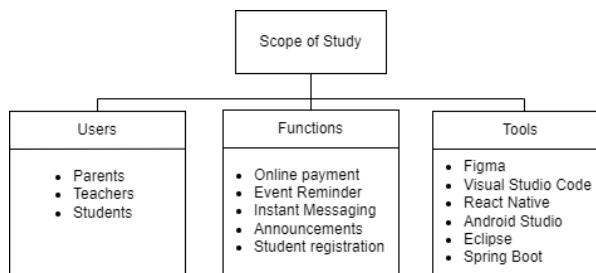


Figure 1.4 Scope of Study

This study emphasizes the importance of parent-teacher interaction even when they do not physically interact. Additionally, the goal of this study is to facilitate parents and teachers' communication in a modern, intelligible context. The target users for this study are adults and the range of ages is between 7 to 60 years old. For instance, the intended audience includes parents, teachers, and students in primary schools. In addition, this application's development is restricted to primary schools, which is a constraint. As a result, parents and teachers that are other than primary schools will be regarded unsuitable to use this program since their educational systems may differ. For instance, primary school educational systems may differ from secondary school educational systems, and so forth.

For this application, features like online payments, event reminders, announcements, instant chat, and student registration will be developed. Thus, it is a need to study the necessary information to develop these features. For instance, in order to develop the online payment feature, it is necessary to learn about payment gateways; to develop the event reminder feature, it is necessary to learn about push notifications; to develop the announcements feature, it is necessary to learn how to update data or information; to attempt data passing for instant messaging; and to attempt details for student registration.

On the other hand, in order to produce a successful outcome, it is also necessary to investigate and study the environment and tools used to develop this project. Figma is the platform used to design wireframes and prototypes. The React Native framework is used in Visual Studio Code to develop mobile applications, with HTML and JavaScript as the programming languages involved. Spring Boot is used in Eclipse to develop web-based applications, with Java and HTML as the programming languages involved. Lastly is the Android Studio which includes an emulator with various configurations that developers can use to test their apps on. Additionally, it permits direct testing on physically linked USB devices.

1.5 Requirement Engineering Context

System Context	Context Objects
Subject facet	<ul style="list-style-type: none">• Parents• Students

	<ul style="list-style-type: none"> • Teachers • Processes (registration)
Usage facet	<ul style="list-style-type: none"> • Online payment • Registration • Event reminder • Announcement • Instant Messaging
IT System facet	<ul style="list-style-type: none"> • An application • A web-based application • Payment gateway • Database • Server

Table 1.50 System Context

Development Context	Description
Material Object	<ul style="list-style-type: none"> • People (parents, teachers, students) • Hardware • Documents
Immaterial Object	<ul style="list-style-type: none"> • Students' data • Mobile application • Software components

Table 1.51 Development Context

CHAPTER 2

LITERATURE REVIEW

1.1 Literature Review

Authors	Year	Publications	Title	Findings
Ozmen, F., Akuzum, C., Zincirli, M., & Selcuk, G.	2016	Eurasian Journal of Educational Research	The Communication Barriers between Teachers and Parents in Primary Schools	<ul style="list-style-type: none"> • lack of technology can limit communication opportunities. • Parents' lack of confidence in instructors; refusal to cooperate. • Students' disinterest in telling parents about problems at school
Dharmaraj, P, J. Nelson and S. Ramesh	2017	Int. Journal of Management and Development Studies	Role of parent, teacher association in school management: case analysis	<ul style="list-style-type: none"> • to foster relationships between all students, teachers, and student parents; and to preserve, advance, and safeguard the interests of both medium-sized pupils. • to seriously emphasize the need for maintaining discipline among students, teachers, and parents. • to consult, advise, assist, and collaborate with the relevant district educational officials without delay or reservation.

Siti, S., Halim, M., Hashimah, H.	2022	International Journal of Learning, Teaching and Educational Research	Parental Involvement in Young Children's Education in Malaysia: A Systematic Literature Review	<ul style="list-style-type: none"> • Parental involvement in their education will have a substantial impact on how well they succeed in school. • Children's attendance will increase, their grades in assessments will improve.
Reenay, R.H., Vivian, H.	-	Electronic Journal for the Integration of Technology in Education	Assessing Technology's Role in Communication between Parents and Middle Schools	<ul style="list-style-type: none"> • The school website can be useful in facilitating parental involvement. Technology also gives parents the chance to learn what their children are doing in school without having to be present.
E. Zamora-Intriago, J. Patiño-García, W. Zambrano-Romero, W. Cuenca-Álava, C. Moreira-Zambrano and F. Cuzme-Rodríguez	2018	International Conference on Information Systems and Computer Science (INCISCOS)	Use of mobile application: Means of communication between parents and class teacher	<ul style="list-style-type: none"> • The majority of parents had positive opinions about utilising a mobile app to contact their child's instructor. • Technology-based systems help parents and teachers communicate well.
N. -S. N. Ismail, M. N. Kamaruddin, S. S.	2019	IEEE 9th International Conference on System	Parents-Teacher Assisting Monitoring	<ul style="list-style-type: none"> • developed both in web based and mobile application. • Rapid Application Development (RAD) cycle is

Jamaluddin and N. S. Akmar		Engineering and Technology (ICSET)	Application (PTAMA) System	chosen as a methodology to develop this PTAMA system.
Yahya, N., Halim, H. Z. A., Fauzi, N. F., Khairudin, N. I., & Bakhtiar, N. S. A.	2021	International Journal of Academic Research in Business and Social Sciences	Parent Teacher Associations Mobile Application (PTA-MA) to Enhance Communication among PTA Members During COVID-19 Pandemic	<ul style="list-style-type: none"> • Notification and distribution of information is in real time, feedback from parents and/or teacher. • Financial transactions, including fundraising and spending, are more open. • Via PTAMA, PTA fees can be paid online.

Table 2.10 Literature Review

1.2 Existing Systems

Application	Features	Mobile Application	Desktop
Teno App	<ul style="list-style-type: none"> • Communication • Student Attendance • Worksheets • Teacher Attendance • Diary/Calendar • Timetable/Live Classes • Payment • Marks 	✓	

	<ul style="list-style-type: none"> • Bus Tracking • Memories 		
Atcovation	<ul style="list-style-type: none"> • Faculty Dashboard • Student Dashboard • Navigation • Setting Panel • Regular Attendance • Apply Leave 	√	√
School Plus App	<ul style="list-style-type: none"> • Attendance • Instant Notification • Academic Details • Exam Date, Important Portions • Timetable • Fee Payment 	√	
Hello Parent	<ul style="list-style-type: none"> • Instant Messaging • Daily Schedule • Bus Tracking • Online Fee Payments 	√	√
Myly App	<ul style="list-style-type: none"> • Instant Messaging • Attendance • Homework 	√	√

	<ul style="list-style-type: none"> • Tests and Grades • Calendar and Events with Notifications • Fees Payment 		
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Table 2.20 Existing System

PTA applications' unique features and functionalities may vary depending on the platform or software provider. However, the common elements and features present in various PTA applications currently in use include:

- Communication Tools

PTA application includes chat or messaging options that allow for direct communication between parents and teachers. These technologies make it simple and quick to transmit information, such as announcements, notes, updates on assignments, and status updates.

- Event Management

Events like parent-teacher conferences, meetings, fundraisers, workshops, and school activities can all be planned and organized using the event management capabilities that are frequently included in PTA programs by parents and teachers. Sending invitations, handling RSVPs, and communicating event information and updates can all be facilitated by these capabilities.

- Attendance Tracking

Parents can see their child's attendance records, which include details on absences, tardiness, and early dismissals, through several PTA programs. This function enables parents to monitor their child's attendance trends and, if necessary, contact teachers.

- Grade Monitoring

Parents may get access to their child's grades and academic progress through PTA applications. Parents can monitor their children's progress and talk with teachers about any worries or issues by viewing assignments, test results, and overall grades.

- Multi-platform Accessibility

PTA applications are made to be usable on a variety of gadgets, including computers, tablets, and smartphones. This promotes convenience and flexibility in communication by enabling parents and teachers to access the application at any time and from anywhere.

CHAPTER 3

METHODOLOGY

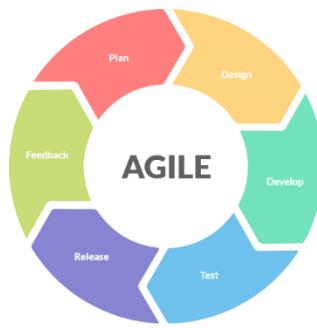
3.1 Research Methodology

Each project requires a distinct approach to be completed with the least amount of risk and in the shortest amount of time possible. The first step is to clearly define the objectives of the PTA mobile application and web-based system. Then, identify the key features and functionalities that the application should provide.

Besides, conduct market research to identify existing PTA mobile applications and analyze their features, strengths, and weaknesses. This can be done by choosing the appropriate research methodology. The methodology used in this project is qualitative methodology which outlines principles and criteria for the collection of qualitative data, the creation of a qualitative analysis, and how to organize qualitative data. The qualitative data in this project is done by conducting secondary research to gather existing data, industry reports, market studies, competitor analysis, and other relevant sources. These details can help put the conclusions from the original study into context and provide evidence for them. This research will help to understand the current landscape and identify opportunities for differentiation and improvement in the application.

After the data is collected, analyze the data systematically by using appropriate data analysis techniques such as categorization that is used in this project. The data is interpreted and presented in the form of tables and figures. The last step of this research methodology is to present the findings in a format that aligns with the purpose and intended audience, such as research report and presentation.

3.2 Development Methodology



The development methodology used in this project is Agile Methodology. Agile methodology is a particular kind of software development technique that anticipates the requirement for flexibility and applies a level of pragmatism to the delivery of the finished product. Agile software development necessitates a cultural change in many businesses since it emphasizes the clean delivery of specific software components rather than the full solution.

This software development methodology allows us to build a program incrementally with short iterations over 1 to 4 weeks. A step-by-step process helps align the development process with business needs. Agile development is an iterative software development methodology focused on creating adaptive products. A project goes through multiple iterations, each building on the previous iteration and gradually moving closer to the final product. Insights are used to adapt the product in the next iteration. Agile also welcomes ideas for new features that can be added with each iteration. While traditional development only considers business needs at the beginning of the process. This means that at the end of the development cycle, the product may not be optimized or meet business needs.

The Agile methodology performs best in a situation that is moderately uncertain. It is extremely difficult, if not impossible, to precisely describe the requirements and design of the solution before the project begins in such a setting. As the project develops, flexibility and adaptability are crucial for further defining and perfecting the solution requirements and design. Additionally, due to quicker start-up periods, the Agile approach often has a quicker time to market. We can deliver at least a portion of the solution early with a staged development effort rather than having to fully complete it. Additionally, because the customer is actively involved in providing feedback and input throughout the development process, an Agile methodology should produce improved customer satisfaction and more effective solutions.

3.3 Project Activities

3.3.1 Requirements Gathering Phase

This phase includes conducting literature reviews and analyses of existing systems in order to determine the requirements and features for a Parent-Teacher Association Application. Documentation is prepared after evaluating the research study such as the features, development tools used, knowledge required, and so on.

Features	Online Payment	<ul style="list-style-type: none">• Parents able to pay fees via online.• Teachers able to check the transaction history.
	Event Reminder	Parents will be reminded on the event happening.
	Instant Messaging	Parents and teachers able to chat with each other in real-time by text message.
	Announcements	<ul style="list-style-type: none">• Parents able to know what is happening in school.• Teachers able to upload or update any new announcements.
	Fundraising	<ul style="list-style-type: none">• Parents able to fundraise any activities or events organized by school.
Development Tools	Figma	To design the wireframe and develop prototypes.
	Visual Studio Code	To develop the front end of mobile application using React Native.
	Android Studio	To provide an emulator to run the mobile application.
	Eclipse	To develop the front end of web-based system using Spring Boot Framework.
Knowledge	Programming Languages	HTML, CSS, JavaScript, Java

	Project Management	To manage and plan for this project development.
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Table 3.3.1 Requirements Gathered

3.3.2 Planning Phase

After the requirements are gathered and features are determined, project planning which is the Gantt Chart is created in order to ensure the project is able to be done within the time frame.

Project Tasks/Weeks	1	2	3	4	5	6	7	8	9	10	11	12
Idea & Title Proposal												
Introduction												
Objectives												
Analysis												
Methodology												
Proposal Defence												
Design & Development												
Interim Report Submission												

Table 3.3.21 Gantt Chart FYP I

Project Tasks/Weeks	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Continuation of project progress															
Development of user interface (Prototypes)															
Development of user interface (React Native)															

Progress Assessment 1															
Demonstrate & run simple test															
Refine & Fix coding error															
Development of user interface (Spring Boot)															
Demonstrate & run simple test															
Refine & Fix coding error															
Submission of Dissertation (soft bound)															
Progress Assessment 2															
Viral Oral Presentation															
Submission of Project Dissertation (hardbound)															

Table 3.3.22 Gantt Chart FYP II

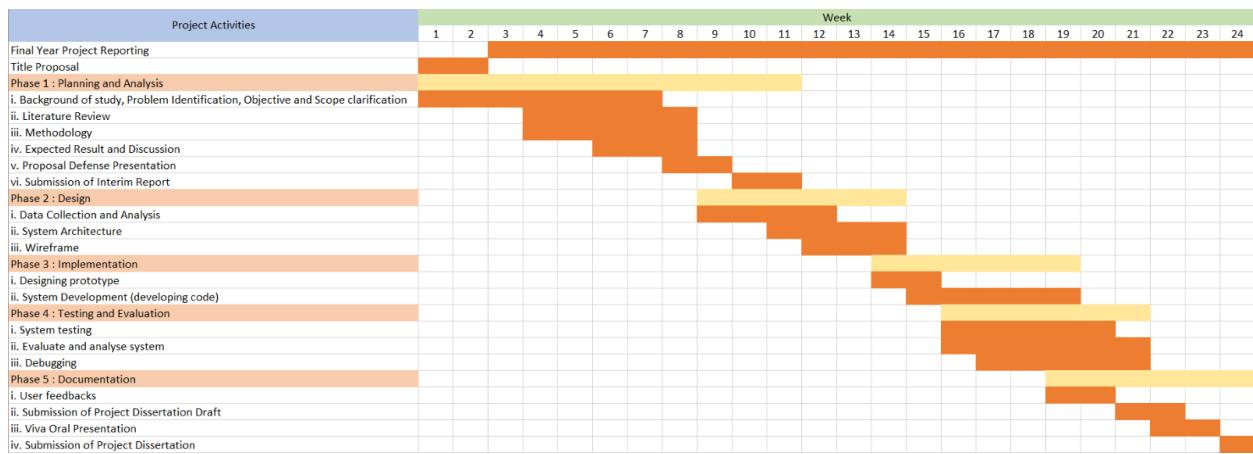


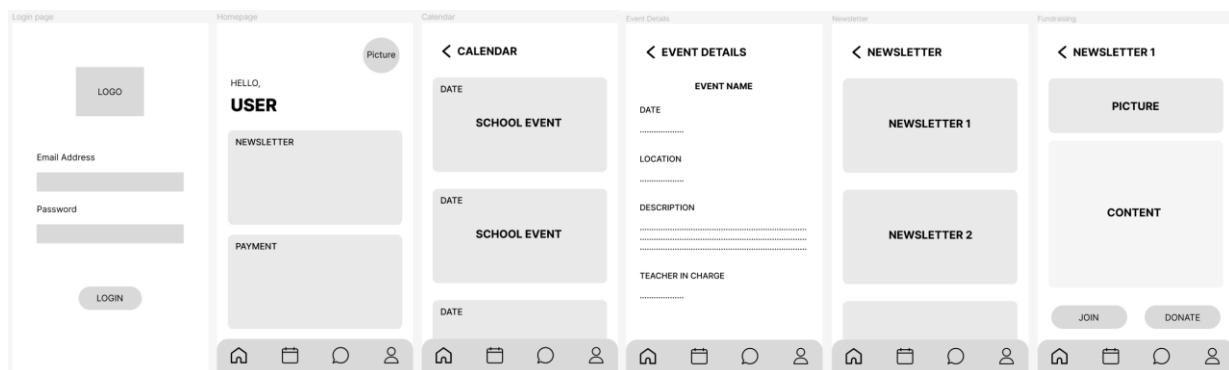
Table 3.3.23 Gantt Chart FYP I & II

3.3.3 Design Phase

To get a clear picture of how user activities flow, wireframes, and prototypes for the mobile application and web-based system are constructed for each application.

Wireframes:

- Mobile Application (Parents):



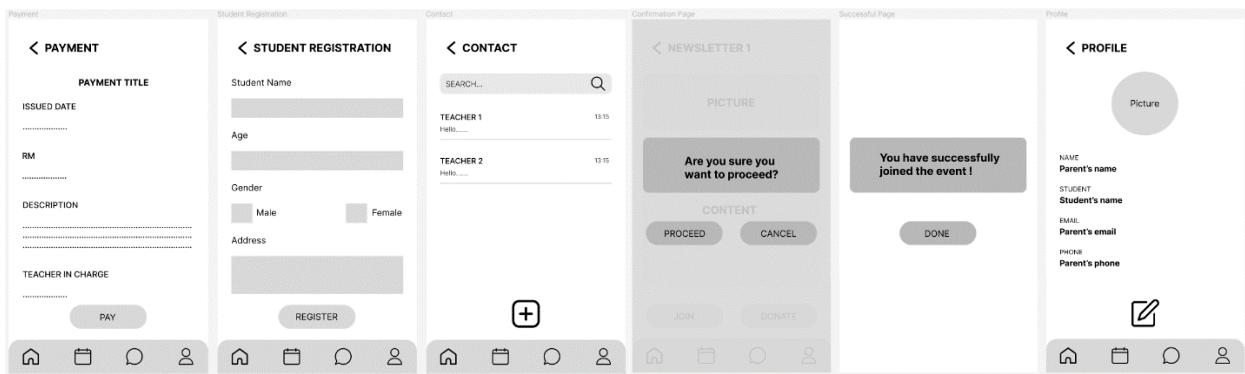


Figure 3.3.1 Wireframes of Mobile Applications (Parents)

- Web-based System (Teacher):

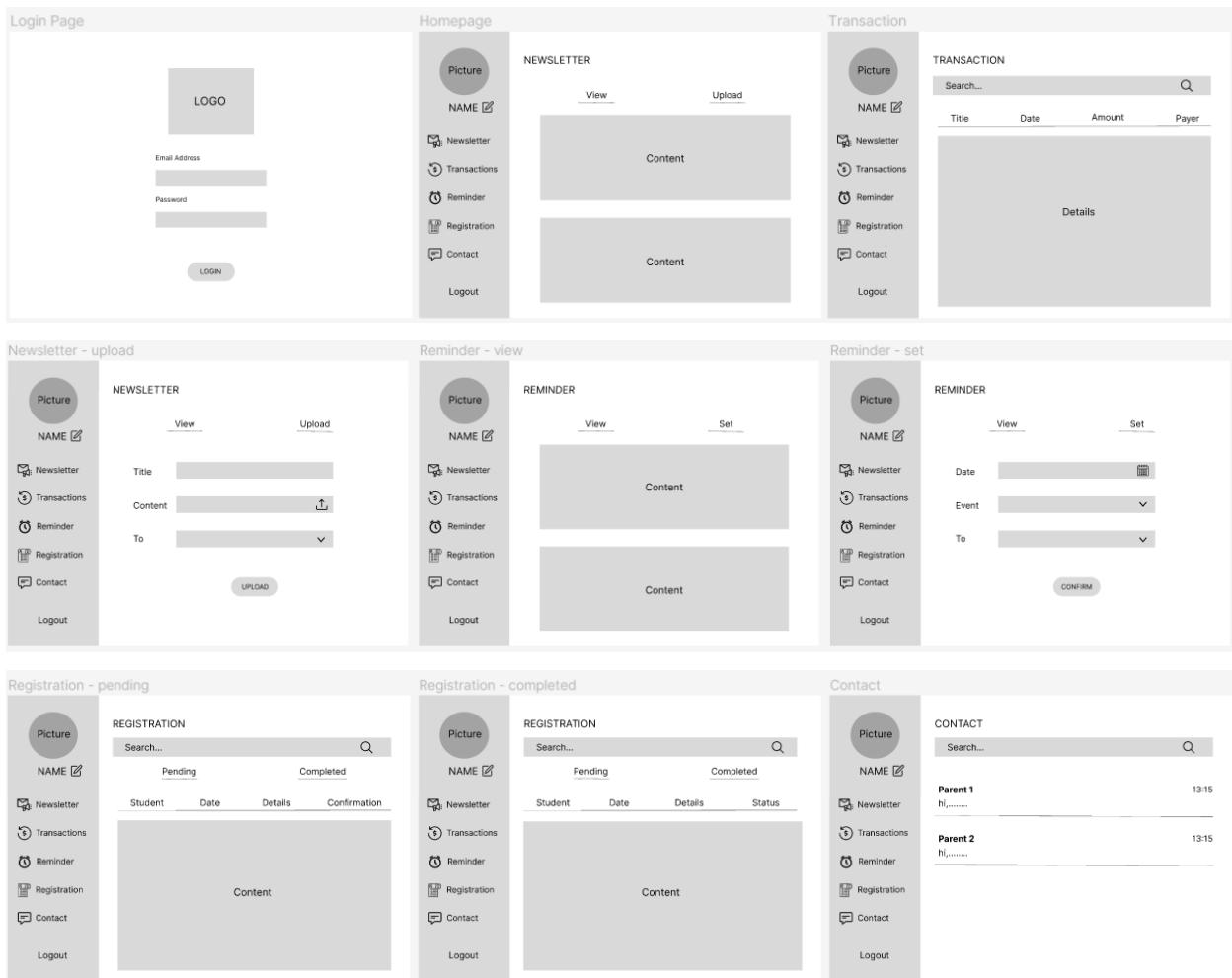
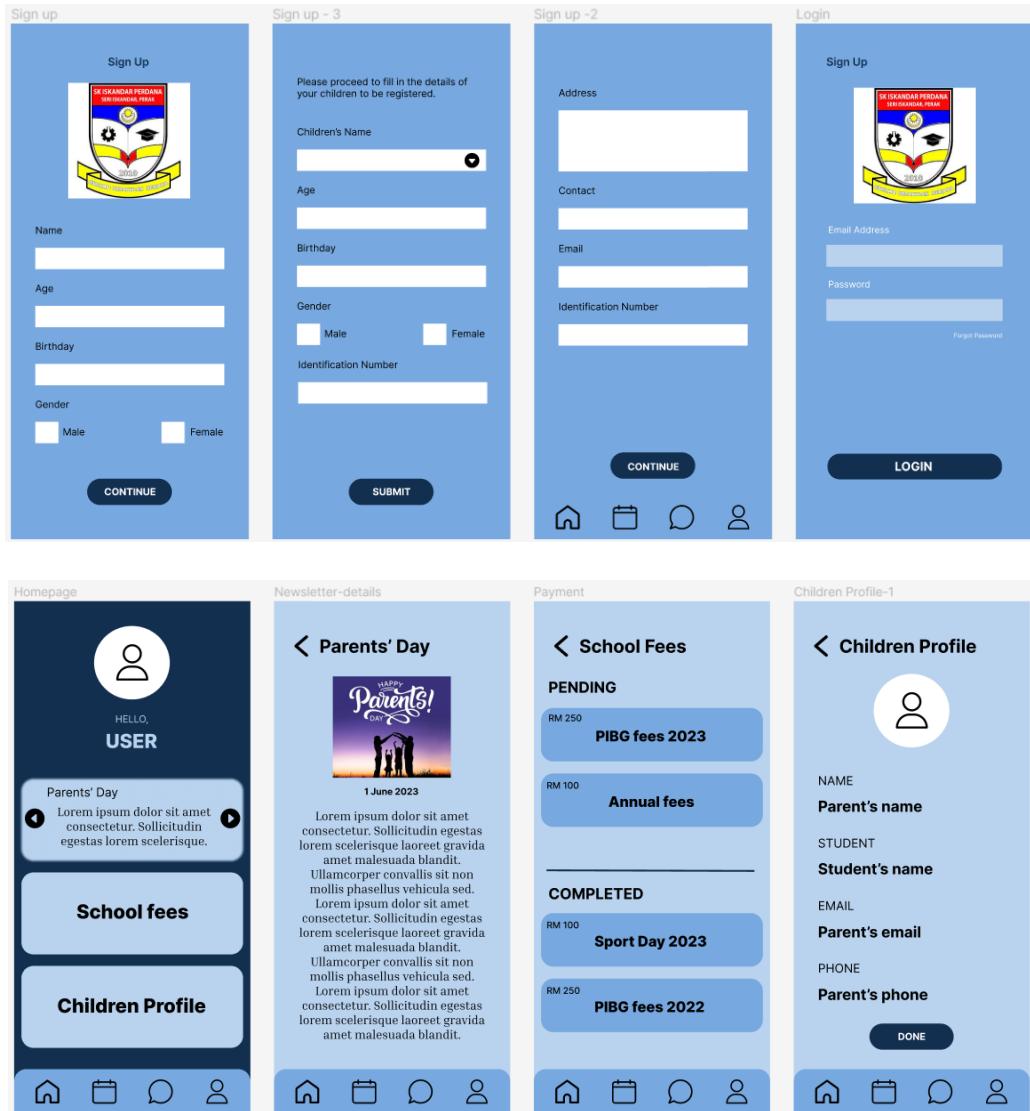


Figure 3.3.2 Wireframes of Web-based System (Teachers)

Prototypes:

- Mobile Applications (Parents):



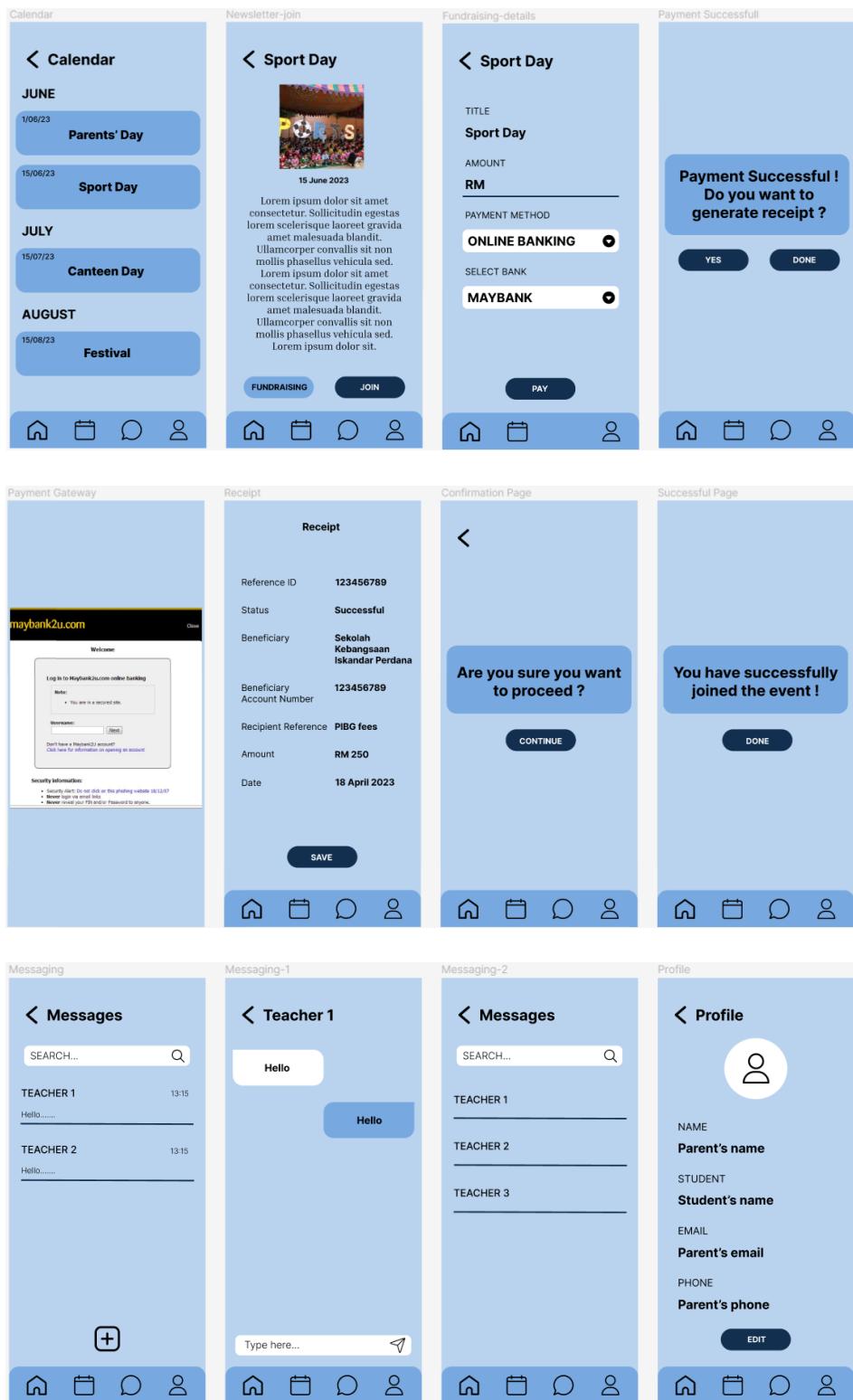


Figure 3.3.3 Prototypes of Mobile Application (Parents)

- Web-based System (Teachers):

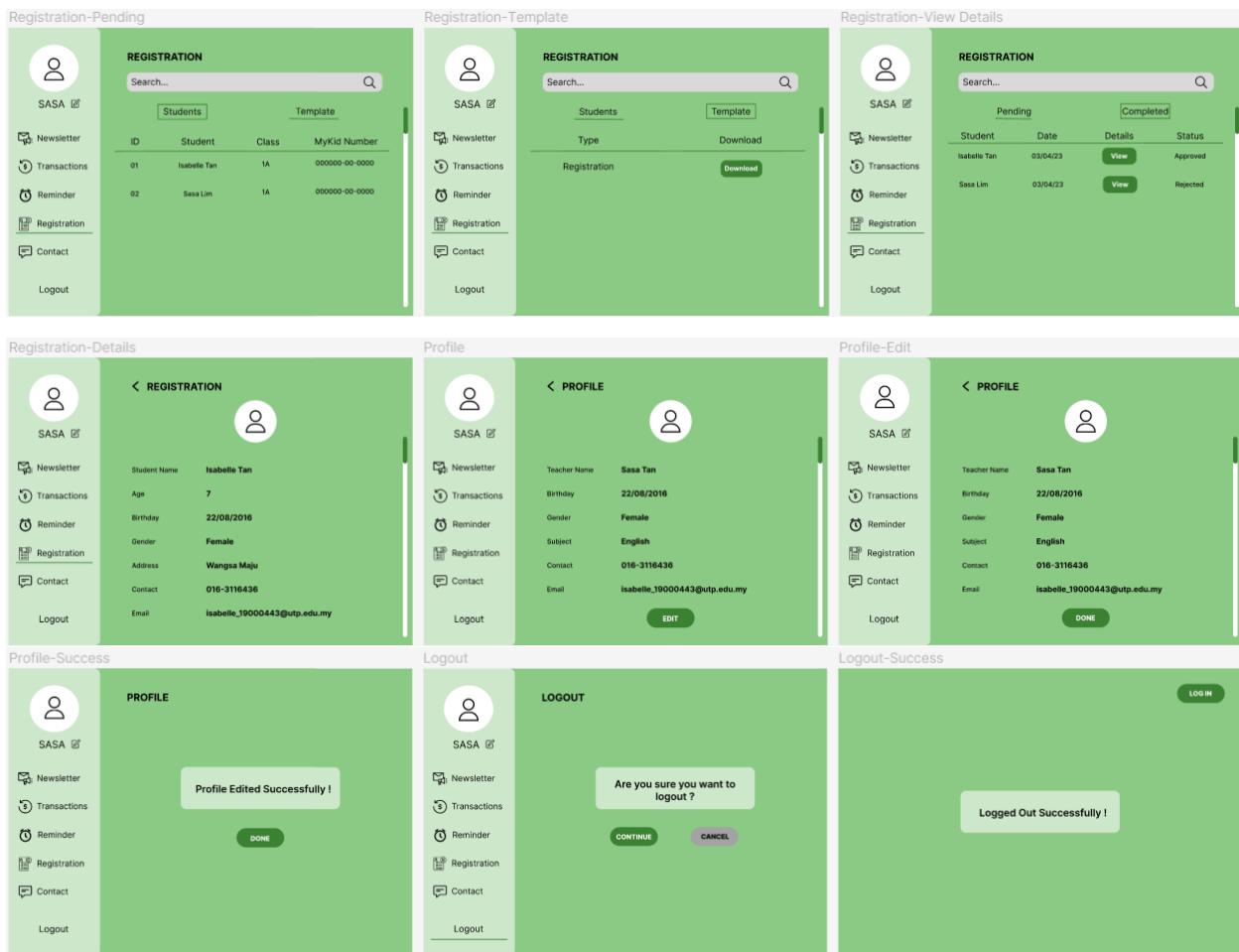


Figure 3.3.4 Prototypes of Web-based System (Teachers)

3.3.4 Development Phase

During this stage, the initial tasks involve configuring the environment and composing code using programming languages. For instance, in order to begin writing code for the front end of a mobile application, the React Native framework must be established within Visual Studio Code. Similarly, for web-based applications, the Spring Boot framework should be set up in Eclipse.

3.3.5 Testing Phase

The testing phase aims to assess the functionality of the application, which will be conducted simultaneously with the development phase. Its purpose is to verify the proper functioning of the written code and ensure that it is free of errors.

3.3.6 Review Phase

During the review phase, user feedback is gathered through an online survey. This phase takes place after the completion of the final application. This crucial step aims to enhance user satisfaction and ensure that the application fulfills user requirements. In order for users to evaluate the application, they will be provided with the APK file for the mobile application and a link to access the web-based system.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Expected Outcome

The expected outcome of a Parent-Teacher Association (PTA) application project development can vary based on the specific goals and requirements of the project. Hence, the following are some general expected outcomes of this project:

- Enhanced communication

The PTA application will provide parents and teachers with a platform for better communication. Parents will be able to get timely updates, notifications, and announcements regarding events, activities, and vital information at school. Additionally, they can speak with teachers directly to voice issues, pose inquiries, and take part in conversations.

- Increased parental involvement

The PTA application will promote and make it easier for parents to get more involved in school matters. Parents will have simple access to join events, volunteer opportunities, and fundraising opportunities at their children's schools. A stronger feeling of community, better support for school projects, and better student achievements can all result from this increased involvement.

- Streamlined event management

The PTA application will make it easier to plan and run school events. Parents will be able to access event information all in one spot. The application can automatically send out event-specific information, remind users of upcoming events, and even collect feedback from attendees.

- Efficient fundraising

By offering online fundraising alternatives, monitoring fundraising progress, and promoting various fundraising campaigns, the PTA application can simplify the fundraising process. By showing how money is spent and how it affects the school and kids, it can help promote transparency. These attributes can increase fundraising efforts and bring in additional funding.

- User-friendly interface

Parents, teachers, and administrators can easily access and use the features of a well-designed PTA application because of its user-friendly layout. All stakeholders will be more likely to accept new technologies and take an active role in the process.

4.2 Requirement Engineering Analysis Modelling

- Use Case Diagram

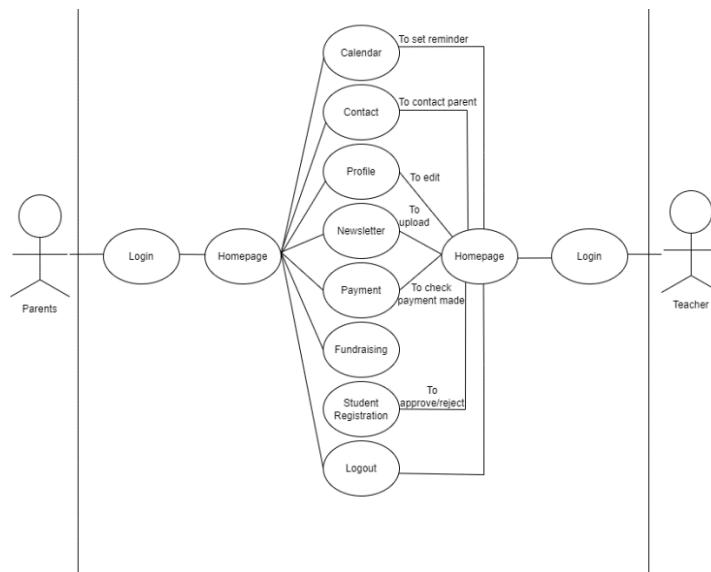


Figure 4.10 Use Case Diagram

- State Chart Diagram (Parents)

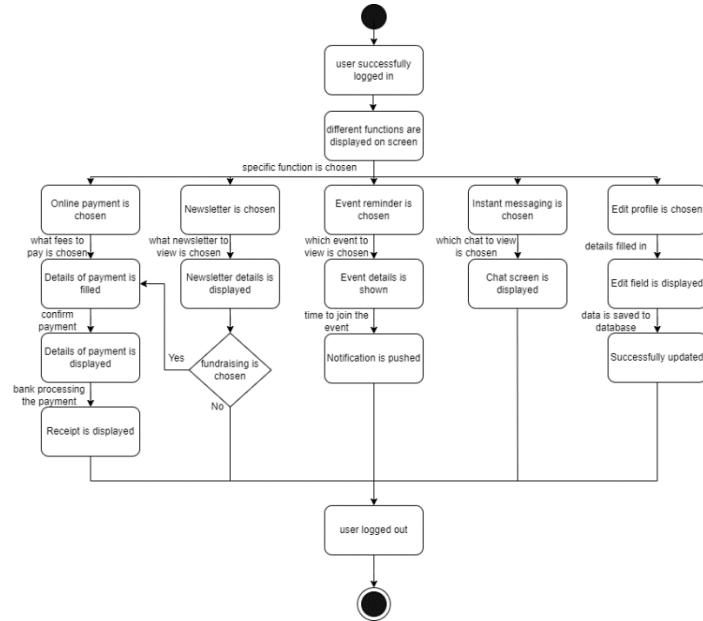


Figure 4.11 State Chart Diagram (Parents)

- State Chart Diagram (Teachers)

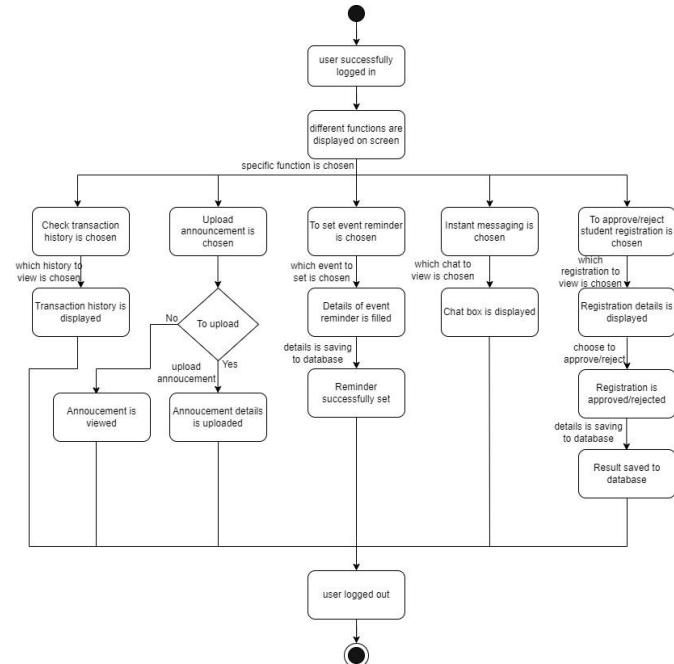


Figure 4.12 State Chart Diagram (Teachers)

- Flowchart (Parents)

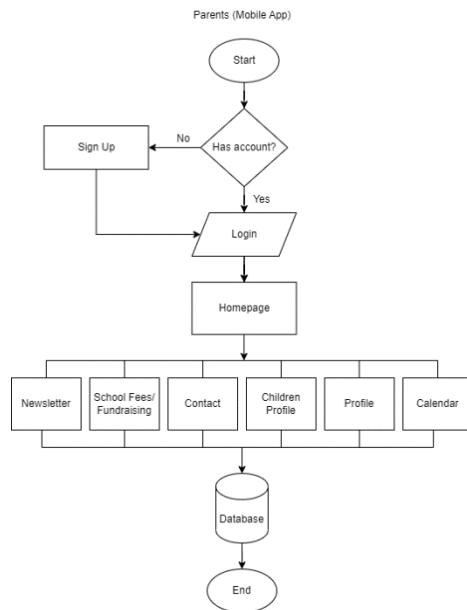


Figure 4.13 Flowchart (Parents)

- Flowchart (Teachers)

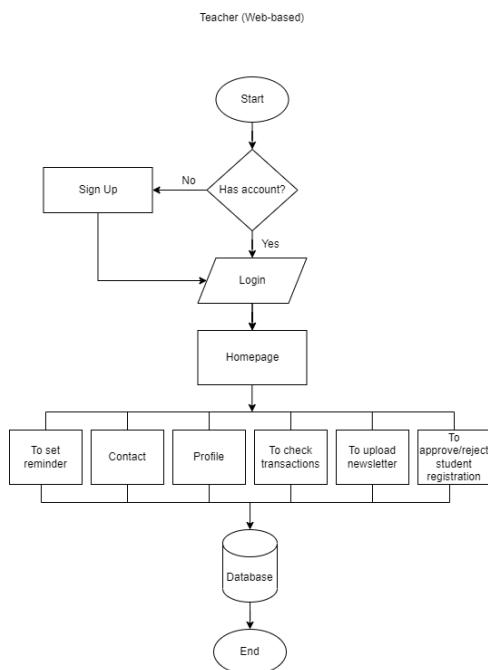
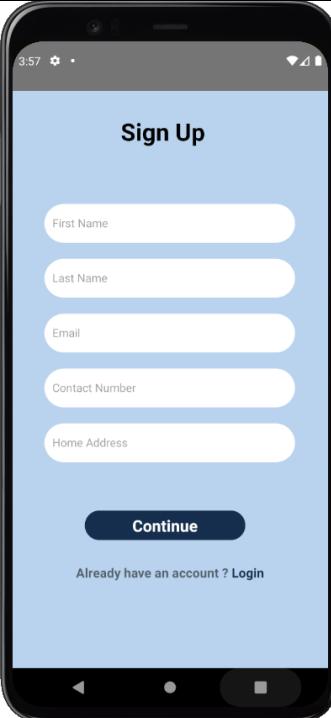
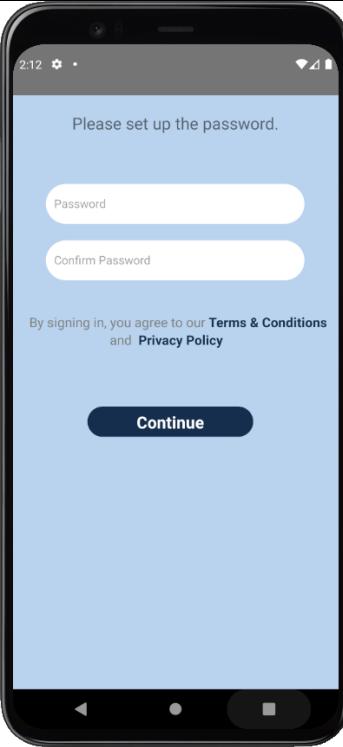
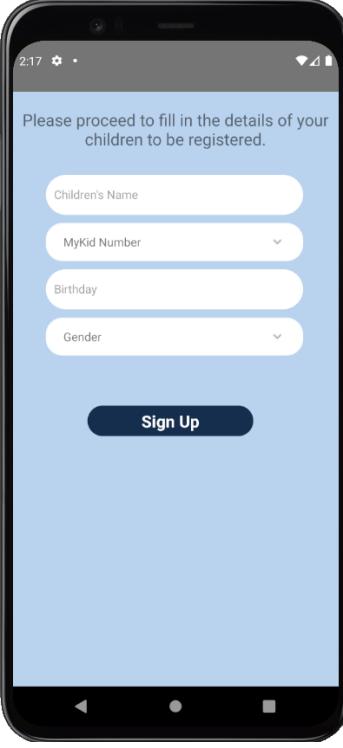


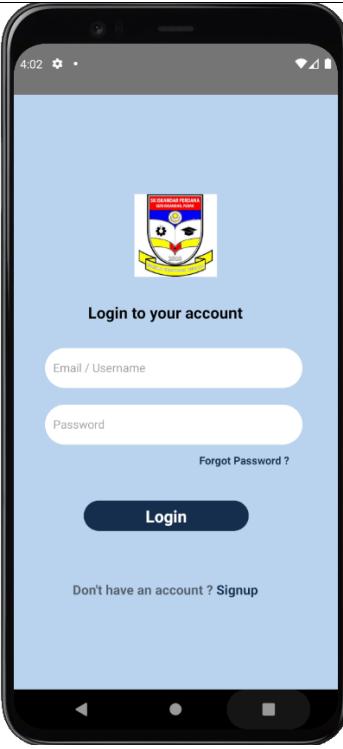
Figure 4.14 Flowchart (Teachers)

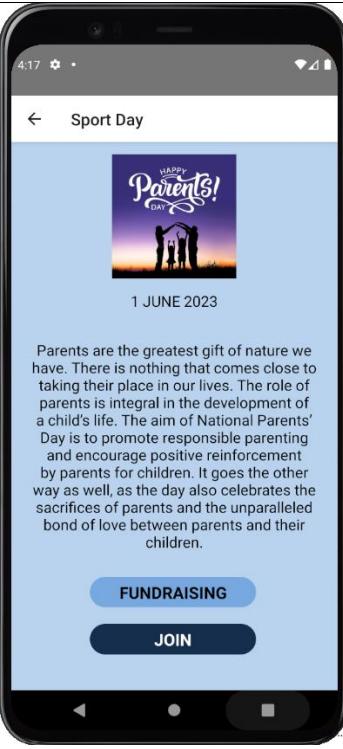
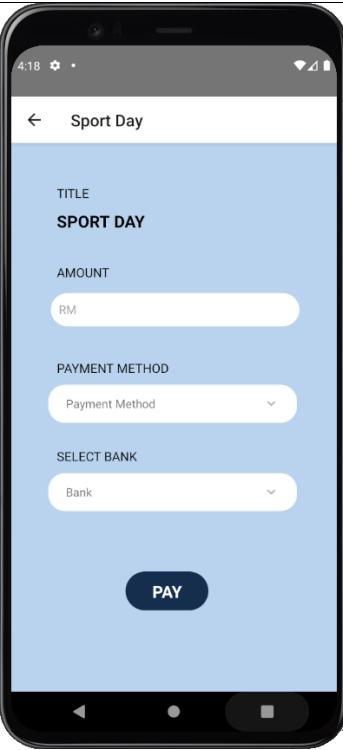
4.3 Graphical User Interface

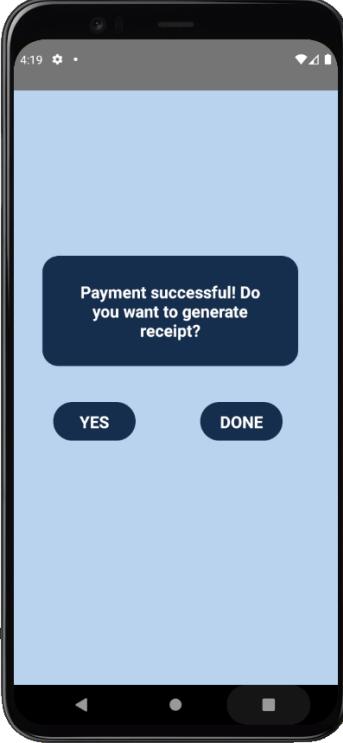
The table below shows the GUI and functions of the PTA mobile application for parents:

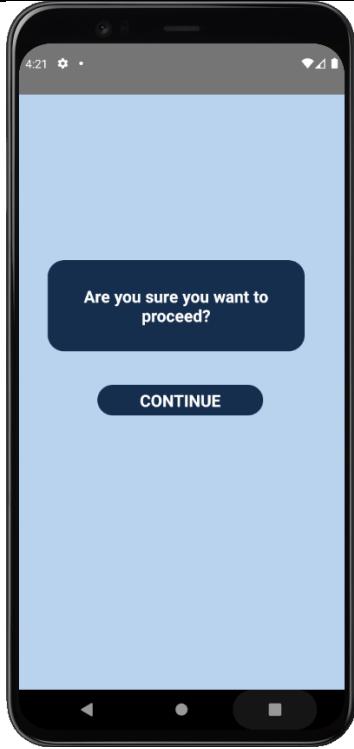
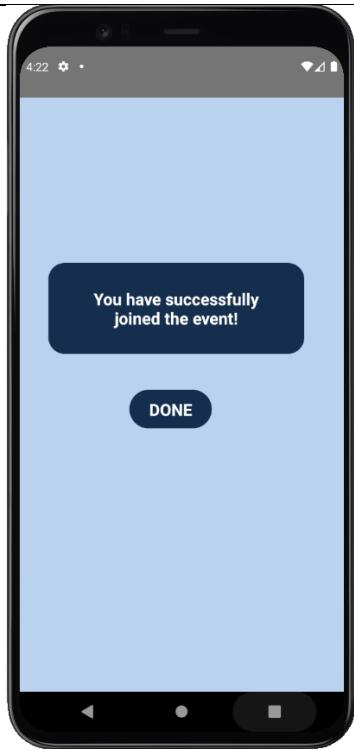
Screens	Graphical User Interface	Description
Login/Sign Up		This screen is to prompt parents whether they want to login or sign up.
Sign Up - Parent		This is the first page of the Sign-Up page which will prompt parent's details from the parent.

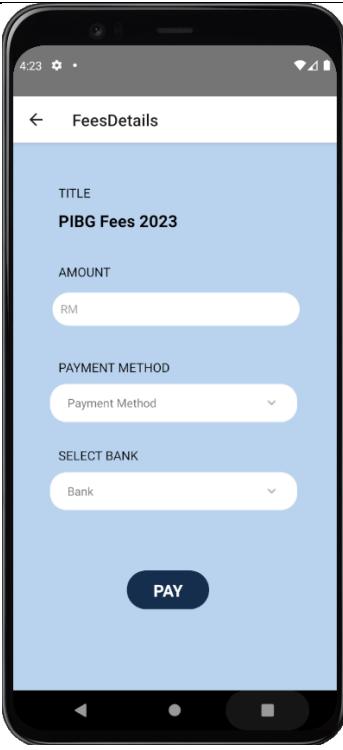
Sign Up - Password		After filling in the parent's details, parents will be prompted to set up the password.
Sign Up - Children		After parent's details are being verified, parent will need to fill up their children's details that are already registered in database.

Login		After completed the sign-up process, parents will have to login in order to start to use the application.
Dashboard		After login, dashboard will be shown. The dashboard includes a navigation bar which has the functions of home, calendar, message, and profile. Besides, parents is able to view the newsletter/events happening in school, school fees, and children profile.

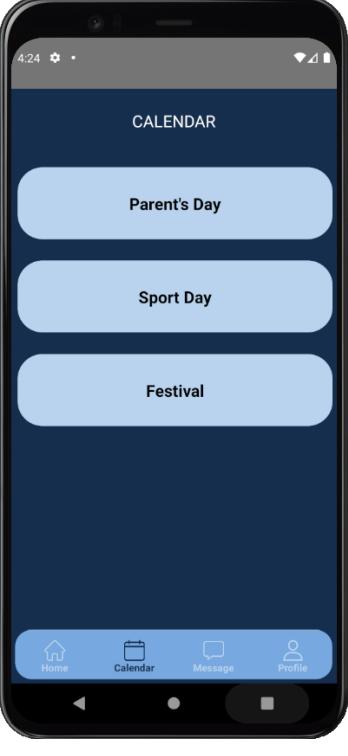
Newsletter details		This is the newsletter which will show the details of the event happening in school such as the date, venue, and parents able to choose to join and/or fundraising.
Fundraising details		When the parents chooses to fundraise the event, the fundraising details will be shown, and parents has to fill in the details needed.

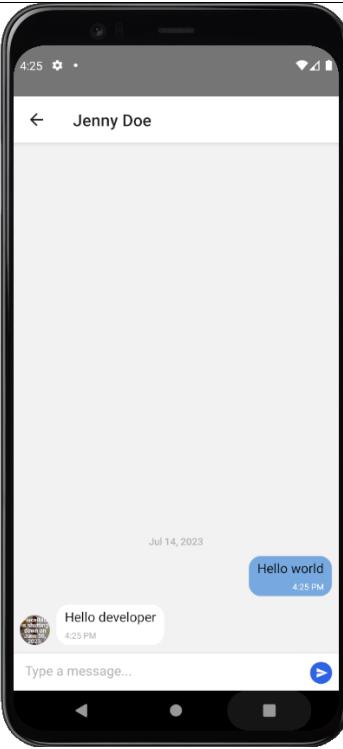
Prompts receipt		After the payment is successful, parents has to choose whether they want to generate the receipt.
Receipt		This is the receipt page that show the details of the payment.

Prompt join event		When the parents chooses to join the event instead of fundraising, this screen will confirm with the parents of their decision to join the event.
Successfully join event		After parents confirms to join the event, this page will be shown to tell parents that they are successfully join the event.

School fees		This page is showing the pending and completed transactions.
Fee details		When parents select the fees under 'Pending' for example, 'PIBG Fees 2023', the fees details will be shown, and parents will need to fill in the details if they decide to make the payment.

Completed Transaction		When parents select the fees under ‘Completed’ for example, ‘PIBG Fees 2022’, the details of the transaction will be shown.
Children profile		This is the page where parents can view their children profile.

Calendar	 <p>The screenshot shows a mobile application interface titled 'CALENDAR'. It displays three event cards with rounded corners and a light blue background. The first card is labeled 'Parent's Day', the second 'Sport Day', and the third 'Festival'. Below these cards is a dark blue background area. At the bottom of the screen, there is a navigation bar with four icons: 'Home' (house), 'Calendar' (calendar), 'Message' (speech bubble), and 'Profile' (person). The time '4:24' is visible at the top left of the screen.</p>	<p>This is the page to display all the events that parents decided to join, it will show parents the event details such as date, time, venue, and so on if parents click on the button for example 'Parent's Day'.</p>
Message	 <p>The screenshot shows a mobile application interface titled 'Message'. It displays a list of messages from different users. Each message includes the user's profile picture, name, timestamp, and a short message content. The messages are as follows:</p> <ul style="list-style-type: none"> Jenny Doe - 4 mins ago: Hey there, this is my test for a post of my social app in React Native. John Doe - 2 hours ago: Hey there, this is my test for a post of my social app in React Native. Ken William - 1 hours ago: Hey there, this is my test for a post of my social app in React Native. Selina Paul - 1 day ago: Hey there, this is my test for a post of my social app in React Native. Christy Alex - 2 days ago: Hey there, this is my test for a post of my social app in React Native. <p>At the bottom of the screen, there is a navigation bar with four icons: 'Home' (house), 'Calendar' (calendar), 'Message' (speech bubble), and 'Profile' (person). The time '4:25' is visible at the top left of the screen.</p>	<p>This is the page where communication occurs between parents and teachers. Parents can search for the teachers that they want to contact.</p>

Chat		This is the chat screen.
Profile		This is the parent's profile.

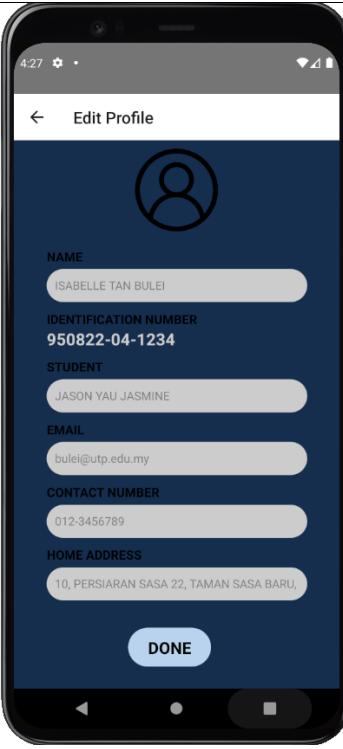
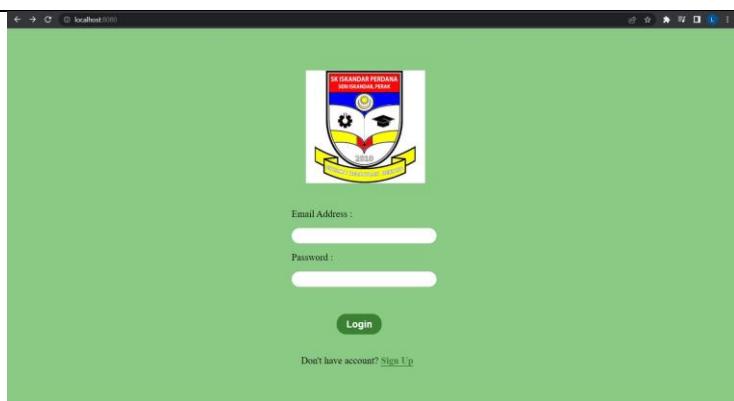
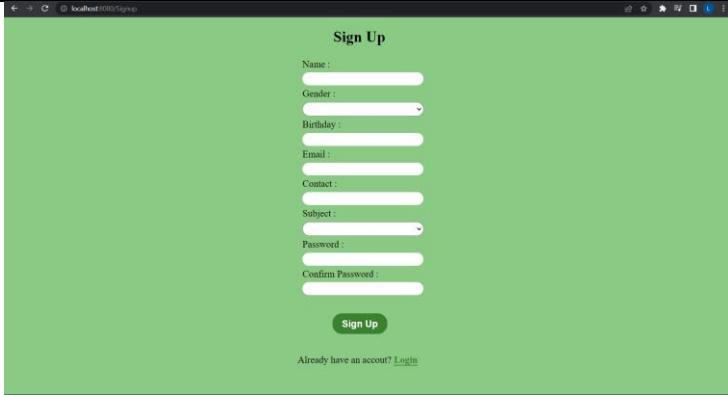
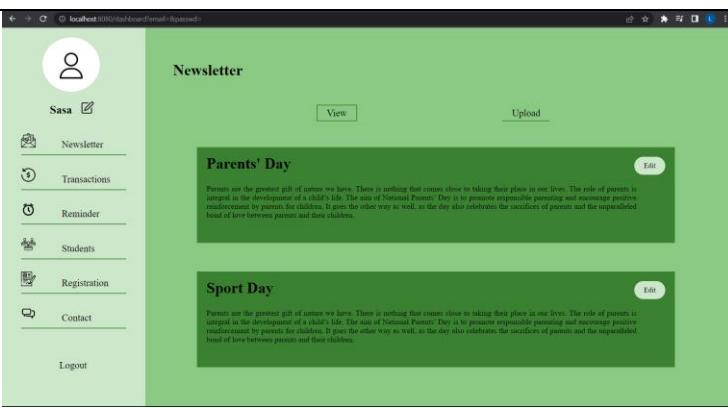
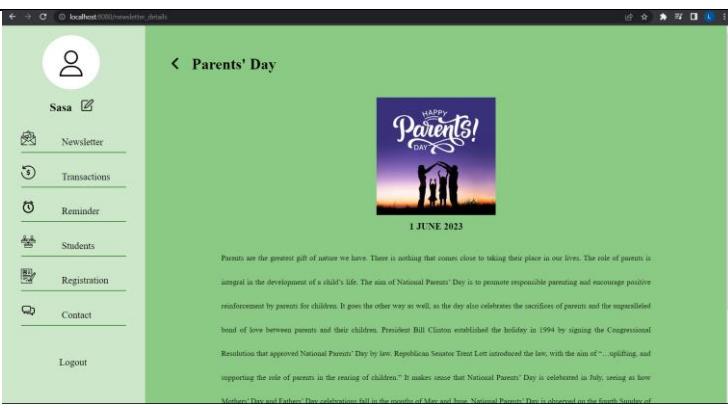
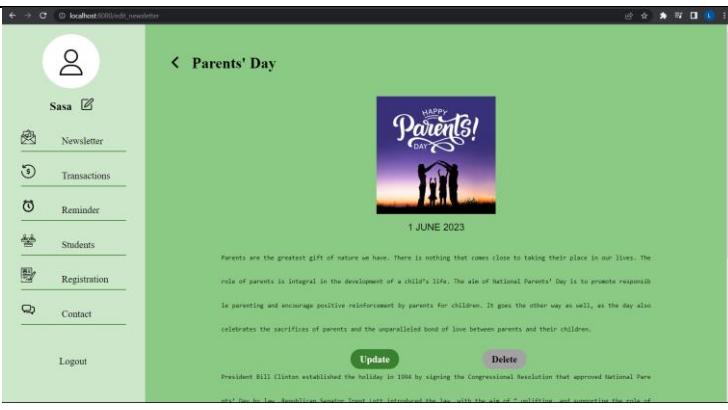
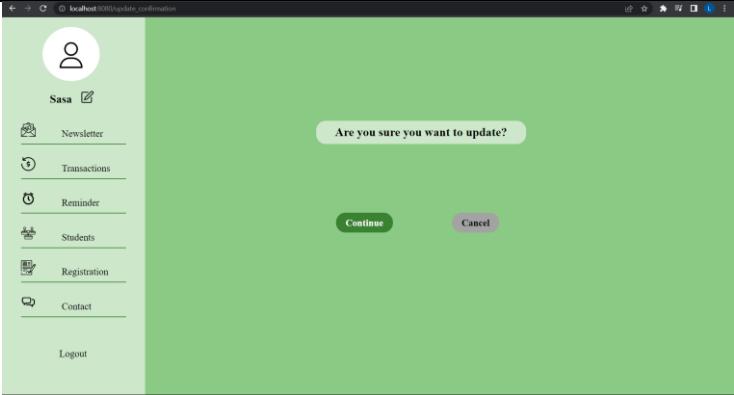
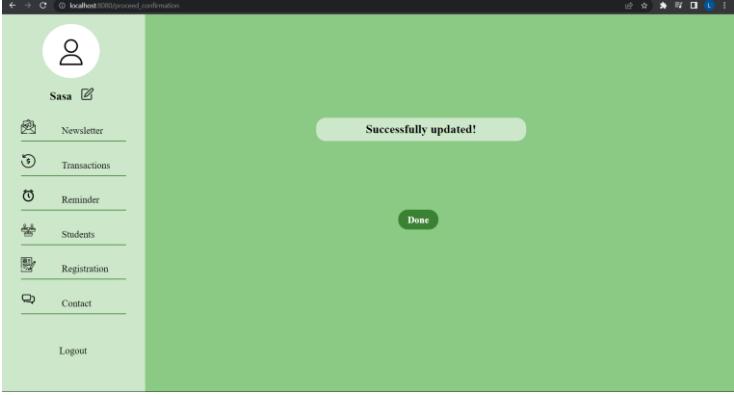
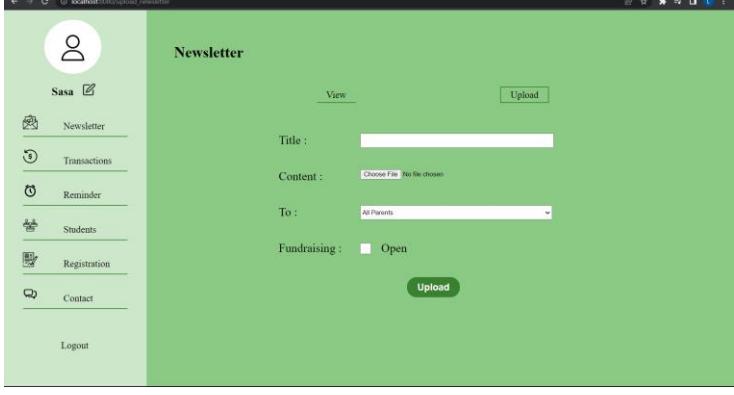
Edit profile		Parents can edit their details.
--------------	---	---------------------------------

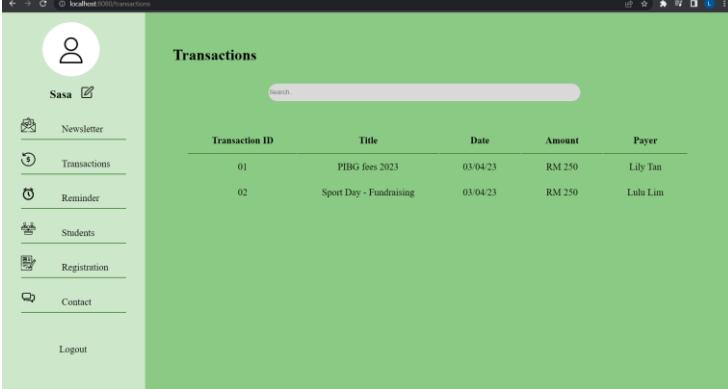
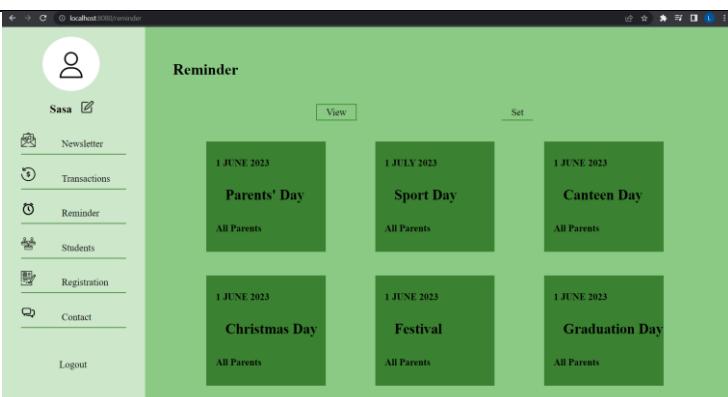
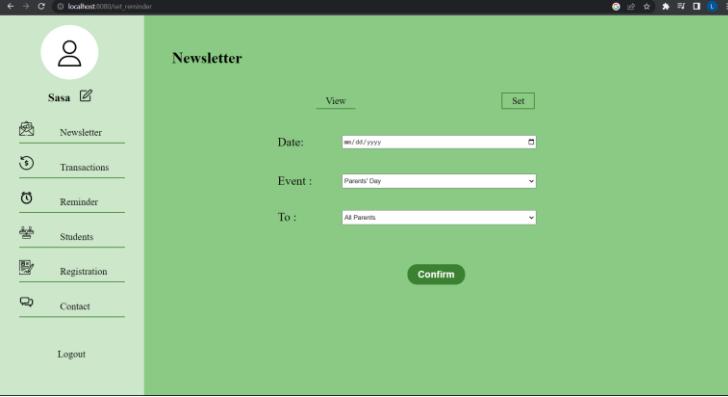
Table 4.10 Graphical User Interface of Mobile Application (Parents)

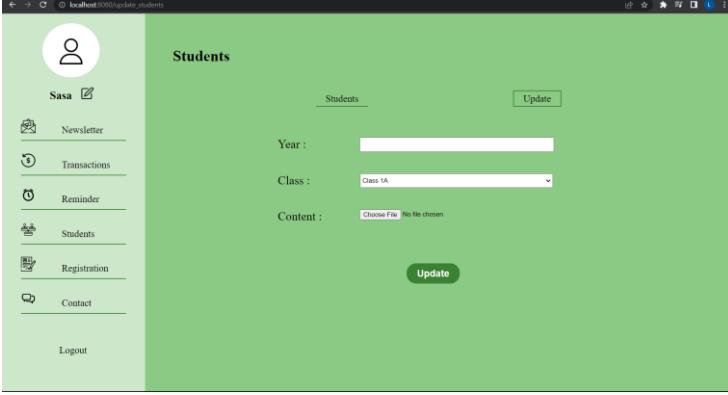
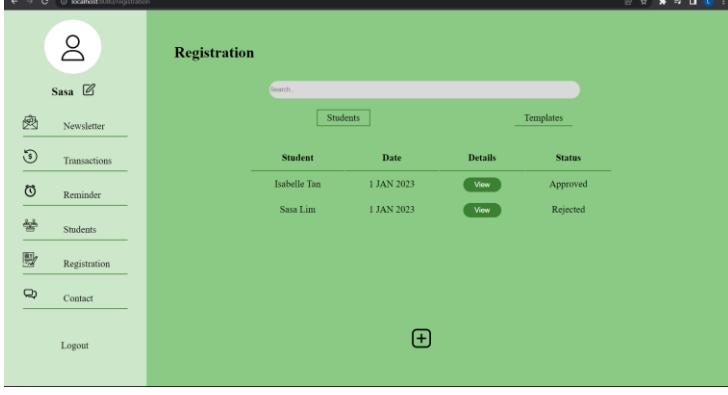
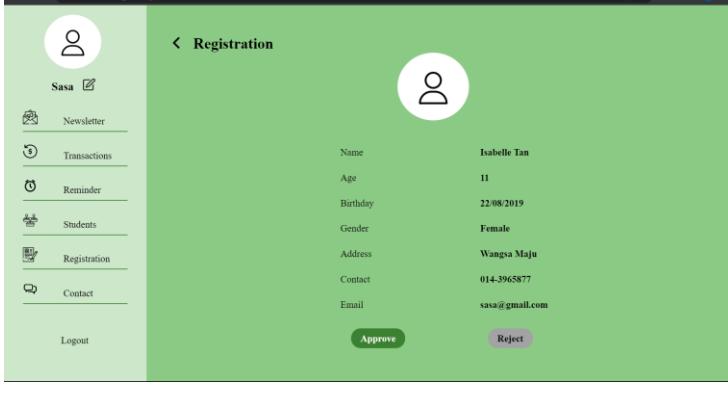
The table below shows the GUI and functions of the PTA mobile application for parents:

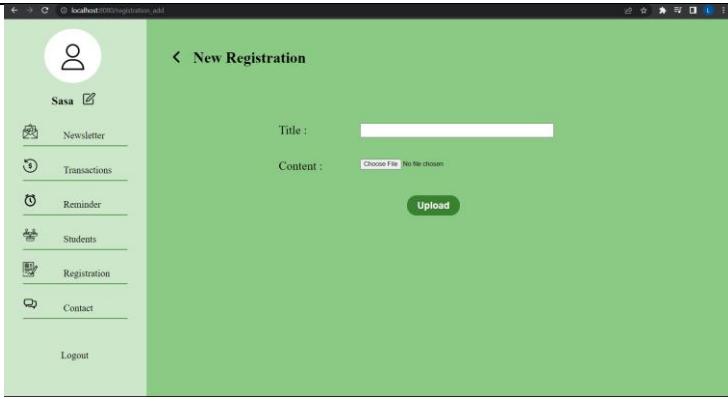
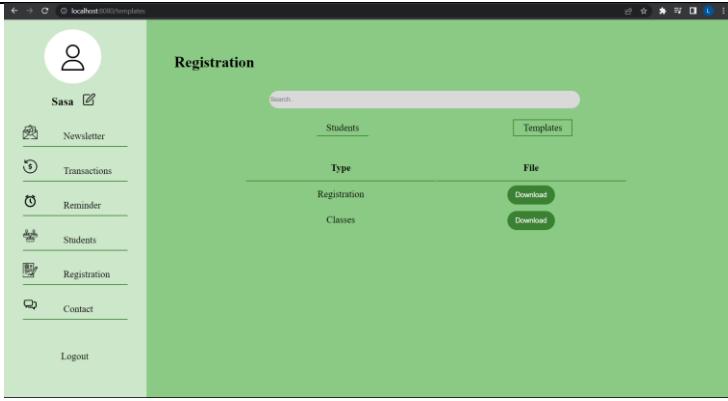
Screens	Graphical User Interface	Description
Login		This is the login page.

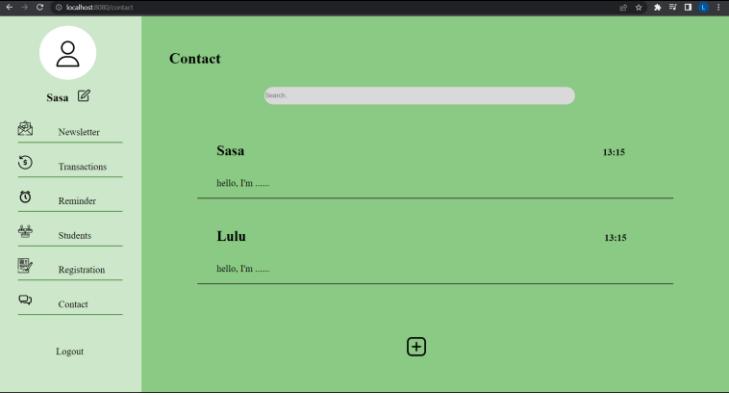
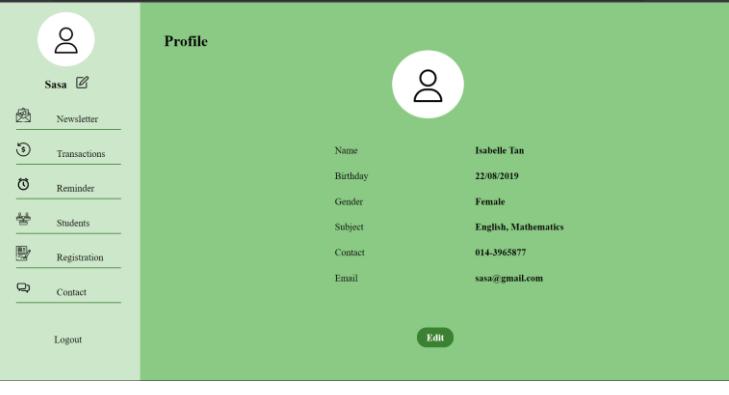
Sign up		This is the sign-up page.
Homepage		This is the homepage which is showing the newsletter.
Newsletter		When teachers click on the newsletter, the details will be shown.
Edit Newsletter		Teachers can choose to edit/delete the newsletter.

Update/Delete Confirmation		This is the confirmation page to confirm with teachers of their actions made.
Successfully Updated		This is the page to tell the teachers that their action is successfully made.
Upload Newsletter		This is the page for the teachers to upload newsletter. The uploaded newsletter will also be shown in the mobile app.

Transactions		This is the page for the teachers to view and check the transactions made from the mobile app.
Reminder		This is the reminder that the teachers have already set to the respective parents.
Reminder Details		This is the reminder details.
Set Reminder		This is the page for teachers to set reminder for parents.

Students		This is the list of current students including their student id, class, and so on.
Update Students		This is the page for teachers to update students' class if there is any changes.
Registration		This is the registration page that show the registered students but yet to be accepted or rejected.
View Student Details		When teachers click on the 'View' button from previous page, the registered student details will be

		displayed, and teachers can decide whether to accept or reject.
New Registration		When the '+' button is clicked on the 'Registration' page, teachers can upload the new registration file.
Templates		This is the page where all the templates are able to be downloaded by teachers for example the templates for student registration and update student.

Contact		This is the page where teachers communicate with parents.
Add Contact		Teachers can search for the parents they want to contact.
Chat		This is the chat screen.
Profile		This is the profile of teachers.

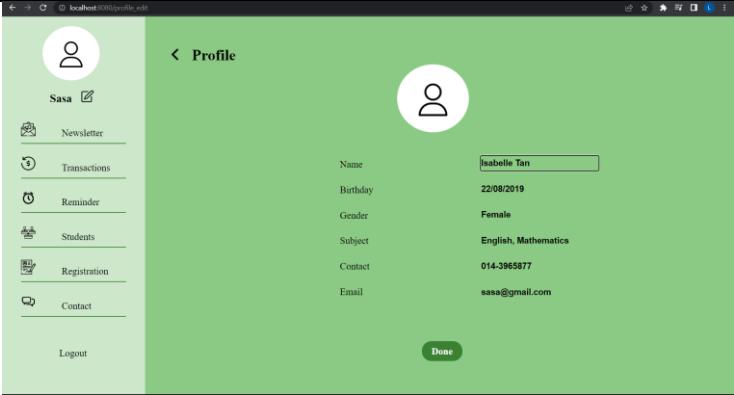
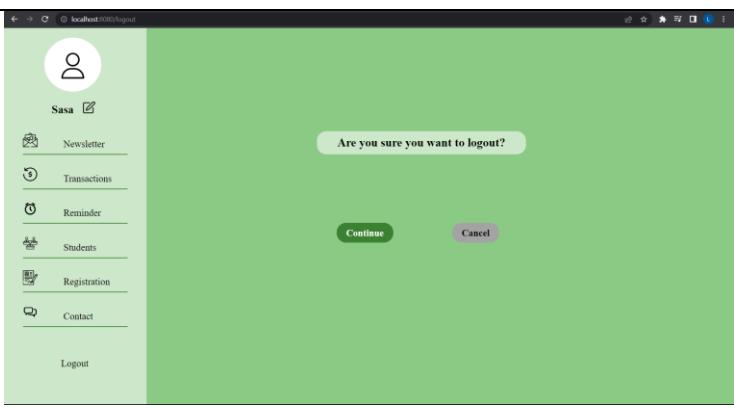
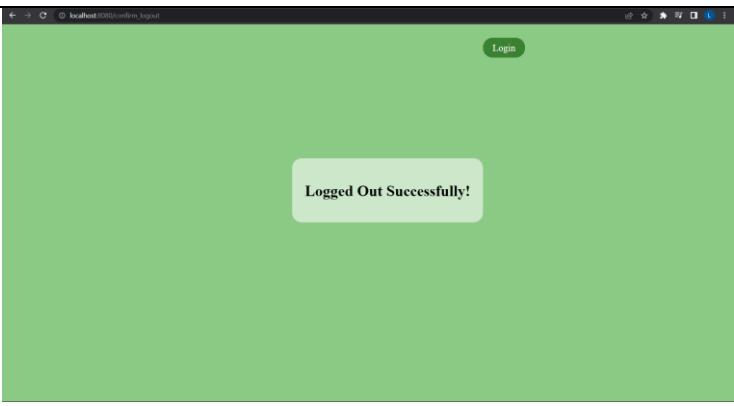
Edit Profile		Teachers can edit their profile in this page.
Logout		Confirmation to logout will be shown when teachers click on the logout button.
Logout Successfully		A successfully logged out page will be shown.

Table 4.11 Graphical User Interface of Web-based System (Teachers)

Templates

The following are the excel templates that are mentioned earlier in the GUI of Web-based system, screen ‘Templates’. Teachers will need to follow these templates when uploading the excel file for respective module, for example student registration. This is because the system will read the data from the excel file and display it on the screen. Hence, the format of the excel file is important in order to display the data correctly on screen.

- Student Registration

	A	B	C	D	E	F	G	H	I
1	Student Name	MyKid Number	Age	Gender	Date of Birth	Home Address	Parents Name	Contact Number	Email
2	Jason Yau Jasmine	123-456-789	7	Male	23-Oct-16	Wangsa Maju	Jasmine Yau Jason	012-3457891	jason@gmail.com
3									
4									
5									
6									
7									

Figure 4.15 Student Registration Excel Template

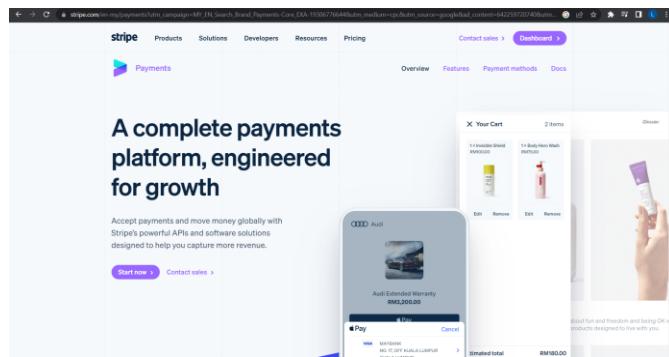
- Update Students

	A	B	C
1		Year:	2023
2		Class:	1A
3		Teacher:	Lily Tan
4		Student Name	Student ID
5	1	Jason Yau	111
6	2	Jasmine Lim	112
7	3	Sasa Ling	113
8	4	Lulu Tan	114
9	5	Salu Lin	115
10	6	Lusa Tan	116
11	7	Tan Li Peng	117
12	8	Wong Hor Sek	118
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
	< >	1A	1B 1C +

Figure 4.16 Update Students Excel Template

4.4 Payment Gateway

PTA application's payment gateway acts as a link between the application and the financial institutions or payment processors. It enables the safe transfer of payment information and guarantees the privacy and security of sensitive data, including bank account or credit card numbers. To accommodate the varying needs of parents and contributors, the payment gateway should offer a variety of payment methods, such as credit cards, debit cards, and online banking.



The payment gateway that is being implemented in this project is Stripe. To demonstrate how the payment gateway works in this project, the following is developed:

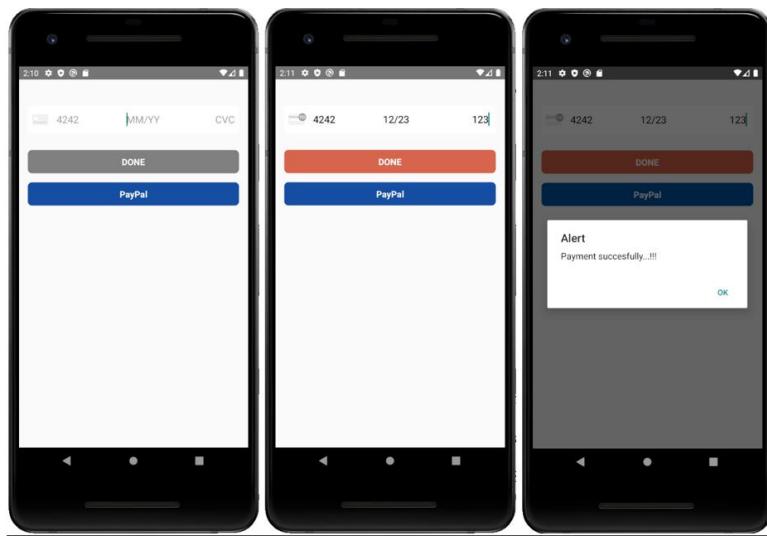


Figure 4.40 Graphical User Interface of Payment Gateway

The following is the results in Stripe Test Mode after the payment is successful:

The screenshot shows the Stripe Test Mode logs on the "Logs" tab. It displays a list of API requests and their responses. One successful request is shown for a POST to "/v1/payment_intents":

```

POST /v1/payment_intents/pi_3NTQFLHJSXyhkWmJ1LLlx6nZ/confirm
Status: 200 OK
ID: req_cuP1T2b4k46yC
Time: 7/13/23, 10:15:55 PM
IP address: 103.29.29.211
API version: 2020-03-02
Source: Stripe/AndroidBindings/20.25.8 @stripe/stripe-react-native/0.28.0
(https://github.com/stripe/stripe-react-native)
Key: -d997b99-05bb-4fe2-a9f0-8da8099ee7c9

```

The "Response body" section shows the JSON response:

```

1  {
2   "id": "pi_3NTQFLHJSXyhkWmJ1LLlx6nZ",
3   "object": "payment_intent",
4   "owner": ...

```

200 OK	POST	/v1/payment_intents/pi_3NTQFLHJSXyhkWmJ1LLlx6nZ/confirm	<u>10:11:55 PM</u>
200 OK	POST	/v1/payment_intents	<u>10:11:55 PM</u>
200 OK	POST	/v1/ephemeral_keys	<u>10:11:54 PM</u>
200 OK	POST	/v1/customers	<u>10:11:54 PM</u>

Figure 4.41 Logs of the Calls of API

POST /v1/payment_intents/pi_3NTQFLHJSXyhkWmJ1LLlx6nZ/con...

Status	200 OK
ID	req_cuP1Tzbk1WzGyC
Time	<u>7/13/23, 10:11:55 PM</u>
IP address	103.29.59.211
API version	2020-03-02 
Source	Stripe/v1 AndroidBindings/20.25.8 @stripe/stripe-react-native/0.28.0 (https://github.com/stripe/stripe-react-native)
Idempotency	Key — dd97df09-05bb-4fe2-af90-8da8099ee7c9 

Figure 4.32 Details of the Post

Response body	
1	{
2	"id": "pi_3NTQFLHJSXyhkWmJ1LLlx6nZ",
3	"object": "payment_intent",
4	"amount": 10000,
5	"amount_details": {
6	"tip": {
7	}
8	},
9	"automatic_payment_methods": null,
10	"canceled_at": null,
11	"cancellation_reason": null,
12	"capture_method": "automatic",
13	"client_secret": "pi_3N*****-*****-*****-*****YnfP",
14	"confirmation_method": "automatic",
15	"created": 1689257515,
16	"currency": "inr",
17	"description": null,
18	"last_payment_error": null,
19	"livemode": false,
20	"next_action": null,
21	"payment_method": {
22	"id": "pm_1NTQFLHJSXyhkWmJ4wG3QnJ",
23	"object": "payment_method",
24	"billing_details": {
25	"address": {
26	"city": null,
27	"country": null,
28	"line1": null,
29	"line2": null,
30	"postal_code": null,
31	"state": null
32	},
33	"email": null,
34	"name": null,
35	"phone": null
36	},
37	"card": {
38	"brand": "visa",
39	"checks": {
40	"address_line1_check": null,
41	"address_postal_code_check": null,
42	"cvc_check": null
43	},
44	"country": "US",
45	"exp_month": 12,
46	"exp_year": 2023,
47	"funding": "credit",
48	"generated_from": null,
49	"last4": "4242",
50	"networks": {
51	"available": [
52	"visa"
53],
54	"preferred": null
55	},
56	"three_d_secure_usage": {
57	"supported": true
58	},
59	"wallet": null
60	},
61	"created": 1689257515,
62	"customer": null,
63	"livemode": false,
64	"type": "card"
65	},
66	"payment_method_types": [
67	"card"
68],
69	"processing": null,
70	"receipt_email": null,
71	"setup_future_usage": null,
72	"shipping": null,
73	"source": null,
74	"status": "succeeded"
75	}

```

Request POST body
1  {
2    "payment_method_data": {
3      "type": "card",
4      "payment_user_agent": "stripe-android/20.25.8;CardInputView",
5      "card": {
6        "number": "*****4242",
7        "exp_month": "12",
8        "cvc": "***",
9        "exp_year": "2023"
10      }
11    },
12    "use_stripe_sdk": "true",
13    "return_url": "stripesdk://payment_return_url/com.paymentgateway",
14    "client_secret": "*****",
15    "expand": [
16      "payment_method"
17    ]
18  }

```

Figure 4.33 Response Body and Request Post Body

4.5 Data Analysis

A Parent-Teacher Association (PTA) mobile application's success and efficacy must be evaluated considering user involvement. It is possible to get important insights by carefully analyzing user data, which includes parameters like app usage frequency, session length, login frequency, and the features that users specifically access. It is feasible to determine which features are the most well-liked and often used by users by looking at these engagement data. The user community's most beloved features may be further improved and enhanced with the help of this information. Additionally, monitoring user interaction over time enables evaluation of the effect of changes or the addition of new features. By monitoring user engagement metrics before and after such changes, the effectiveness of these updates can be evaluated and validated. This data-driven approach ensures that the PTA application will constantly change to accommodate its users' wants and preferences.

In addition, for a PTA mobile application, communication efficacy data analysis is crucial. It becomes feasible to evaluate the effectiveness of various communication channels used within the application, such as push notifications or in-app messages, by examining metrics like message open rates, click-through rates, and response rates. The evaluation and optimization of communication strategies are made possible by this study, which identifies areas for development and allows for the customization of messaging to guarantee that crucial information reaches its target audiences in an efficient manner. The PTA application may improve its strategy and increase the possibility of meaningful engagement amongst parents, teachers, and administrators by identifying which communication strategies provide higher engagement and response rates.

Last but not least, the effectiveness of fundraising initiatives and event management features inside a PTA program is heavily dependent on data analysis. It is possible to get important insights by keeping track of important indicators including donation amounts, participation rates, ticket sales, and event attendance. By analyzing this data, it is possible to evaluate the performance of fundraising efforts and gain a thorough understanding of the efficacy of various tactics and campaigns. Data analysis trends and patterns can be used to pinpoint problem areas and maximize fundraising efforts. The PTA can make educated decisions, improve the planning and execution of events, and refine future initiatives thanks to this data-driven approach.

4.6 Testing and Maintenance

Testing is an essential phase in the development of a PTA application. It entails methodically examining and approving the performance, features, and operations of the application. To make sure the application meets the desired quality requirements, testing should include a variety of factors, including usability, compatibility, security, and performance. Before the application is made available for usage, any problems, flaws, or inconsistencies can be found and fixed through thorough testing. Functional testing is done to confirm how each feature behaves, compatibility testing is done to guarantee smooth operation across many platforms and devices, and security testing is done to safeguard user data and guard against vulnerabilities.

After the PTA application has been launched, maintenance is a continuous activity. It entails keeping an eye on the application's functionality, fixing problems, and implementing essential upgrades or improvements to guarantee its continuous usefulness. Bug fixes, security patches, software updates, and compatibility improvements are examples of maintenance duties. It is easier to spot opportunities for improvement and make the necessary changes when performance measurements, user feedback, and developing technologies are regularly monitored. Regular data backups and checking that the application is still compatible with new hardware and operating systems are also included in maintenance efforts. The PTA application may offer parents, teachers, and administrators a robust, secure, and user-friendly experience by investing in thorough testing and maintenance.

4.7 User Acceptance Testing

The way to conduct user acceptance testing in this project is black box testing. Black box testing involves testing the system's functionality and behavior without having knowledge of its internal code or structure. The following is the black box test scenarios:

Functions	Test Case ID	Scenarios	Prerequisite	Input	Expected Output	Status
User registration (parents & teachers)	1	Verify that a user can successfully register a new account with valid credentials.	User is not registered before.	User's information: name, gender, age, and so on.	User registered successfully.	Pass
	2	Test the scenario when a user tries to register using an existing email address.	User has registered before.	User's information: name, gender, age, and so on.	Error messages are displayed.	Pass
	3	Validate that all mandatory fields are properly validated, and users are prompted to provide the	User fills in the details.	User's information: name, gender, age, and so on.	User able to key in the information and fields are properly validated.	Pass

		required information.				
Login and Authentication	4	Make sure that a registered user can access the program by entering valid login information.	User wants to login.	User's email and password.	User can log in successfully.	Pass
	5	Test the scenario where a user enters an incorrect password.	User wants to login	User's incorrect password.	Error message is displayed properly.	Pass
Messaging	6	Check to see that users can send and receive messages to other users or specified groups, and that the messages are effectively delivered.	User navigates to message screen.	User selects the person that they want to contact.	Message can be sent and received.	Pass

	7	Validate that the application displays sent messages in the sender's "Sent" folder and the recipient's "Inbox" folder.	Users navigate to chat screen.	User clicks on the chat.	Conversations is displayed properly.	Pass
Newsletter	8	Verify that users can view upcoming events and their details.	There has list of newsletters.	User selects the newsletter to view.	Newsletter details is displayed.	Pass
	9	Test the scenario where an event organizer cancels or reschedules an event and confirm that all affected users are notified accordingly.	The schedule is changed.	-	User is notified.	Pass

Payment	10	Validate that users can make payments for various purposes, such as event registrations, fundraising, and school fees.	Payment system is available.	Payment details such as username, amount, date, and so on.	Payment is successfully made.	Pass
	11	Test different payment methods (credit card, PayPal) and ensure that payments are processed securely and accurately.	Payment system is available.	Payment details such as username, card details, date, and so on.	Payment is successfully made.	Pass
	12	Verify that users receive confirmation receipts or notifications after a successful payment transaction.	Payment is successful.	User wants to generate receipt.	Receipt successfully generated.	Pass

Usability and Interface	13	Verify that the application's user interface is simple, easy to use, and intuitive.	System is available.	User navigates through the screens.	User interface is easy to use.	Pass
	14	Verify the application's main navigation menu is clearly visible and available from all pages.	System is available.	User navigates through the screens.	Navigation menu is visible and available from all pages.	Pass

Table 4.70 Black Box Test Scenarios

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

To sum up, the utilization of an online platform for parent-teacher engagement in schools is expected to increase due to its ability to effectively motivate parents and contribute to their children's academic advancement. It is widely acknowledged that greater parental involvement in their children's education leads to improved student performance. However, establishing and sustaining this engagement requires consistent and reliable communication as well as data sharing between teachers and parents. Therefore, the implementation of a PTA application is considered to be highly influential in the education system. This is because PTA application can assist the school

community in a variety of ways, including improved communication, increased parental involvement, simplified event administration, effective fundraising, and data analytics capabilities.

5.2 Limitation

One of the limitations of this PTA application is the potential for limited accessibility. Some parents might not have access to smartphones or dependable internet connections, which can make it difficult for them to use the program to its full potential. The absence of these technological resources can impede their engagement and hinder their capacity to leverage the application's functionalities effectively. Consequently, this limitation may result in a digital divide, where the children are unable to benefit from the application's features due to their limited access to the necessary devices or internet connectivity.

Another challenge may arise from resistance to change or low adoption rates. Individuals who are unfamiliar or uneasy with technology may object to the introduction of a new technology platform. Therefore, it is essential to give parents, teachers, and administrators thorough training and support to guarantee the application is adopted and used successfully.

Additionally, security and privacy issues must be taken into consideration when creating a PTA application. Data protection and sensitive information security must be prioritized. To preserve confidence and safeguard the privacy of all users, it is crucial to put effective security measures in place, such as encryption, secure login procedures, and adherence to pertinent data protection laws.

5.3 Recommendation

User feedback is a valuable resource to enhance the operation and usability of a PTA application. The development team can find out what needs to be improved and find new features that would improve the user experience by routinely asking for feedback from parents, teachers, and administrators. Focus groups, surveys, and user feedback forms included within the application can all be useful tools for getting input. The team is able to match the application to the needs and expectations of the users thanks to this feedback-driven methodology, ensuring that it keeps up with their demands over time.

In addition, the PTA application's capabilities can be substantially increased by integrating it with current educational systems like student information systems or learning management systems. With no need for duplicate data entry and fewer administrative work, this interface

enables smooth data sharing. Integration with current systems can offer parents, teachers, and administrators a more effective and integrated solution by reducing processes and establishing a cohesive digital experience. It cultivates a cohesive ecosystem that encourages cooperation and maximizes the application's influence on the overall management of the school.

Last but not least, the PTA application must be updated and maintained frequently to remain effective. This involves fixing any flaws, security holes, or compatibility problems that could appear. The development team can spot areas for improvement and swiftly deliver updates to address them by regularly monitoring user feedback and responding to it. Additionally, keeping up with industry trends and new technologies enables the introduction of new features and improvements that improve the functionality of the program.

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