

CAPSTONE PLAN

Submitted to the Faculty of

Senior High School

DE LA SALLE LIPA

In partial fulfilment of the requirements

for CAPSTONE Initiatives

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May 2021

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I. PROJECT DESCRIPTION

- **Project Title:** Waste-O
- **Type of Project:** Development and Implementation of Mobile Application
- **Project Proponent/s:**

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- **Number of Beneficiaries:** 1,670 Households
- **Project Beneficiaries:** Residents of Barangay San Jose
- **Location of Beneficiaries:** Barangay San Jose, Lipa City, Batangas
- **Date of Implementation/Duration:** May 2022 / 2 Months
- **Area of Project Implementation:** Barangay San Jose, Lipa City, Batangas
- **Budget Requirement:** No Budget Required

II. BACKGROUND AND OBJECTIVES

After conducting the data gathering process via virtual survey questionnaires and interviews with residents in Barangay San Jose, Lipa City, Batangas, Improper Waste Management was concluded as the area of concern as it is more prevalent in the area. It is also one of the most common yet destructive problems today, as garbage that is improperly disposed of can begin to release methane gases. These gases are greenhouse gases that can destroy the earth's ozone layer and contribute to significant climate changes or global warming (Boehlke, 2018). Through brainstorming, the group gave extensive effort to formulate solutions that would provide the target community with better waste solutions through proper education and involvement. Thus, with the current educational setup, it has been decided that one of the most effective approaches to the issue would be developing an application for the environment; hence, Waste-O was made. Environmental apps like Waste-O are mobile applications created with the intention of encouraging eco-friendly behavior, such as reducing the use of non-reusable materials, recycling, and increasing the level of use of materials that are eco-friendly (Spotlight, 2021). Naturally a team project between CAPSTONE Innovators of all strands (STEM, ABM, HUMSS), Waste-O characterizes the relevance of each strand in their terms. First, the project showcases the application of the STEM strand the most as it revolves around application development that consists of design, coding, and algorithms. Moreover, science is also existent as we tackle Waste Management in the community, along with the ongoing phenomenon, Global Warming & Climate Change. Second, as expenses shall be inevitable for the project's development, the ABM strand shall assist with the group's financial management, handling how funds are collected and allocated for app development, and other specific measures that require expenditures. For HUMSS, proper social and moral conduct is essential in keeping the world, let alone the community, a better place. Therefore, evaluating, comprehending, and responding to the residents' responsibilities and movements is a significant part of making the project an accomplishment. Moving towards a common goal, Waste-O also exists to fulfill 6 of the 17 Sustainable Development Goals: Good Health and Well-Being, Clean Water and Sanitation, Sustainable Cities and Communities, Climate Action, Life Below Water, and Life on Land. In solving such global issues, the group, therefore, aims to:

- To develop an application, Waste-O, that satisfies a sustainable, inclusive, and innovative environmental approach to the community's area of concern

- To instill the value of discipline and care for the environment to the community through Waste-O
- To create a system that teaches the residents how to integrate Waste-O into their daily lives
- To teach the residents how to properly enact waste management through segregation, general clean-up drives, and utilization of the Waste-O application

III. DESIRED IMPACT

DESIRED IMPACT		SPECIFIC MEASURES
	<p>Environmental</p> <p>The main benefit of the Waste-O app is that it could help the residents gain environmental awareness and influence people to create action to significantly lessen waste on land and water and ensure its maintenance.</p>	<ul style="list-style-type: none"> • The Waste-O app will give its users proper knowledge about waste, which can help them learn proper waste management. The app is specifically designed to provide information to the users about the different types of trash there is. It means that the app will have a feature where users can see the definitions of biodegradable, non-biodegradable, and recyclable wastes along with their examples. • The project will include promotion of a fund site for there to be garbage bins implemented to the community. Since there is a considerable record of improper waste disposal in Barangay San Jose, Lipa City, Batangas, the group was able to formulate an idea of suggesting to have trash bins with labels together with the app. Along with the purpose of giving information about the

		<p>different garbage, the bins will help the people segregate them properly. In addition, the bins placed around the different places in the community could help lessen scattered waste.</p> <ul style="list-style-type: none"> • The Waste-O app will provide alternative methods of using waste. As the app provides information regarding the various kinds of waste, it shall also include different videos and manuals on how to utilize the chosen trash besides disposing and/or burning it.
	<p>Technological</p> <p>The Waste-O application could serve as a faster way to promote advocacies, make announcements, communicate and provide information to help solve improper waste management and lessen its implications. In addition, Waste-O application could make the residents of Barangay San Jose accustomed to other information applications, hence, giving recognition to other eco-friendly applications found in application stores. Boosting the popularity of other applications, surely, the community may be able to learn more about proper waste management, and eliminate improper habits.</p>	<ul style="list-style-type: none"> • Waste-O will be an easy-to-use app for users who have downloaded it. Waste-O will have a beginner-friendly layout since users can easily make their account or log in to the app with a few clicks. After that, users will have an easy time navigating the home screen since, with a click, they can navigate the different features of the app. • Waste-O will readily be available to the residents of Barangay San Jose, Lipa City, Batangas. With the help of the barangay officials through promotions on social media, the group can easily send the app to the residents of the chosen community. In addition to this, the app can easily be downloaded through a shared link on any device.

	<p>Social</p> <p>The Waste-O app could help in promoting relationships and cooperation among the residents, making them develop social responsibility and realize that they are responsible for the betterment of the community. Furthermore, clean-up drives will potentially have more participants or volunteers with the help of the application.</p>	<ul style="list-style-type: none"> • Online posters shall be posted on available Facebook pages of the target community and with the help of the barangay captain's facebook account, along with videos to be created by members of the group, to promote the application and its desired contribution in lessening waste and developing discipline and social responsibility amongst the stakeholders of the community. • Officials will be able to disseminate information, including details about their monthly cleaning activities, quicker to the residents of Barangay San Jose, Lipa City, with the help of the announcement feature of the app. • With the help of the calendar and reminder feature of the app, Waste-O can help barangay officials of Barangay San Jose, Lipa City Batangas quickly notify the residents about the schedules of the garbage collections in the community.
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IV. PROJECT DETAILS

The "Waste-O" app has been selected as the issue's chosen project. The group has chosen it because it is modern, simple to use, and can be available for many people. Waste and recycling apps can be a great tool for communicating with, educating, and even entertaining your customers or other constituents (Bothwell, 2020). Essentially, the proposed "Waste-O" app has a design that can assist people in managing their waste better. Its main goal is to provide various facts, tips, and methods for promoting proper waste management. Furthermore, it also aims to help prevent climate change and global warming and its possible long-term effects. Along with these, the target audience of the said project will be the residents of Barangay San Jose, Lipa City, Batangas since Improper Waste Management is the most prevalent problem that the residents could see. Even though the "Waste-O" app is a knowledge application

regarding proper waste management, it has different features that make it unique from most knowledge apps. Users should be able to use various features to have a better understanding of proper waste management and disposal and its importance. The major features are the Information feature, Calendar feature, Forum Feature, and Announcement feature. It will serve as a platform for environmental advocates who aspire to educate the majority and positively change the earth. It also gives people a chance to teach and learn about proper waste management and segregation no matter who they are and what state they might be in, promoting inclusivity that may lead to a safe working environment that unites people to work towards a shared goal. Moreover, the application provides opportunities for the residents to communicate with each other to fix problems that may affect their daily lives in their community. Waste-O app can also help governing bodies and big organizations practice proper waste management and segregation; its features can easily give people access to information regarding the app and its goal. It can inspire other environmentalists to create other platforms that share the same goal as Waste-O.

Sustainable:

Sustainable has been defined as something that can be maintained and something that answers our needs without compromising the future. It can be applied to anything and not just the environment. The app will educate the residents on the most important factors about waste management. Education has always been valuable as it's something that one cannot measure with monetary amounts. Hence, with simple yet comprehensive and effective education for the residents, there will be a better future instead of a compromised one. While we try to save the environment, the app users can also interact with each other and help businesses such as junk shops gain more profit.

Furthermore, through Waste-O, where the app can educate the residents and pass on learnings to the next generations, the younger generation will be knowledgeable and conscious of their actions to the environment. Additionally, the app can boost community participation through different activities such as clean-up drives by the riverside, the river itself, and the barangay as a whole. Not only can the app address and improve the state of the environment, but it also promotes social wellness. Through it, the users and residents can easily interact and plan projects such as clean-up drives once in a while or engage in a conversation. Waste-O can also help eliminate bad traits in waste management, such as using non-reusable materials and throwing garbage in improper cans and places. Through the app, promoting reusable, recyclable, and eco-friendly materials to the users will be done and positively affect the environment after so.

Measurable:

The app should help the residents lessen the cases of improper waste management in the community. Once the app is launched and used by them, they are expected to learn to be disciplined enough and have sufficient knowledge to segregate their trash correctly. Moreover, the app should help residents gain ideas on recycling different trash in their community and let

them know the locations of different junk shops in the community to help them avoid burning their trash. The group will be able to measure the app's success by conducting a survey through google forms. The survey will be disseminated through the email that the residents used when signing up for the app. The group will send it a month before launching the app, and they will also notify the users to answer the same survey two to three months later. The survey will have a total of 4 topics: the residents' perception regarding the cleanliness of the community, their learnings from the application, their activeness in participating in the community's general clean-up drive, and their waste management habits and changes brought by the application. Users will answer the survey through a Likert scale: Strongly agree (Positive impact), Agree (Positive impact), Neutral (No changes), Disagree (Negative impact), and Strongly disagree (Negative impact). As for the success indicator, to know if the project was successful in solving the problem or not, it will be as follows: 75% of the users have a positive view on the cleanliness of their community (For their perception regarding the cleanliness of the community), 60% of the users gained new learnings from application (For their learnings in the app), 60% of the users gained a positive impact to their waste management habits (For their waste management habits), 60% of the users actively participated (in the duration of the implementation) in the community's general clean-up drive (For their activeness in the community's general clean-up).

Achievable:

Project Waste-O's implementation and steps required are feasible and achievable for the group.

1. Using the website, Adalo, the group will be able to create the application without generic coding. Only chosen members will be part of the development team; this team will create the application through the said website and possibly other programming languages like Javascript, CSS, and Python as alternatives.
2. Once the app is created, the group will create digital posters or advertisements that will include the project title and description, the purpose of the Waste-O application, and the benefits that the users can gain from using the application. Along with this, the group will make short videos that will discuss the overview and features of Waste-O. In addition, the group will also discuss the goals and objectives of the project along with the video. Along with the barangay officials, the group will post these advertisements on the Facebook page of Barangay San Jose, Lipa City. Furthermore, the group will request a meeting with the barangay captain, and in this meeting, the group will propose adding bins in the community. It does not matter if the barangay captain accepts or rejects it because it is only a suggestion; this will not affect the application's effectiveness.
3. The group will send online surveys made in Google forms to new users. This survey will ask about their current knowledge about waste management, waste management habits, participation in the community's general clean-up drive, and their perception or views on the cleanliness of their community. The responses from this survey will serve as a guide to

determine whether there will be changes in their answers in the duration of the implementation, which is two months.

4. For the application to work, some of the officials are requested to use the application as they will be mostly updating the announcements and events section of the app to spread information about current and coming events among the users or the residents.

5. As there will be many users creating new accounts, the group will monitor the emails registered by each user to determine whether they are genuinely an official or only a resident. The group will confirm the true role of the user by communicating with an official. If it is found that a resident has signed up as an official in the app, the group will delete their emails in the database of the application which they handle. The group will send a notice to the user through their email regarding their improper behavior. Once their email is removed, they will have to create a new account again to use the application.

6. When users have settled in, the group will monitor their activity in the application. The group will distinguish between active and inactive users by monitoring the date the user last used the application. To respond to the users' queries or concerns in the general forum feature of the application, the group will have shifting members assigned to answer the users' questions daily.

7. The group will closely monitor the status of the application to have a quick response when an anomaly occurs, like lagging of the application and glitches. In addition, if there will be updates in the applications, the group will create an announcement in the Waste-O application and create a post regarding the update on the community's Facebook page.

8. Lastly, the group will send online surveys to every users' email addresses a week after implementing the Waste-O application. The survey's questions will primarily be about their new learnings gained from the application, the changes that occurred in their old waste management habits, their activeness in the community's general clean-up drive, and their views on the cleanliness of their community.

Relevant:

The project mentioned above is relevant to the chosen problem, improper waste management since it could significantly reduce the number of waste thrown improperly in the community. An app will be one of the best solutions for this problem as the world is also in a state of the pandemic, which means that with a click, Waste-O could lead the users to different studies regarding proper waste management. It will show them lessons on biodegradable trash, residual waste, recyclable trash, how to recycle trash, locations of junk shops, a calendar feature to help them remember the schedule of garbage collectors, and announcements from the officials regarding clean-up activities. As stated, the project aims to achieve 6 SDGs. Waste-O could help achieve SDG#3 (Good Health and Well-Being) by reducing the amount of improper waste management and by reducing the amount of waste scattered around the community since it will give users sufficient knowledge on how to manage waste properly, which

could lead to a better environment and fresh air for everyone. Moving on, Waste-O could help achieve SDG#6 (Clean Water and Sanitation) as it could help lessen the amount of waste thrown on the nearby river of the community once the proposed bins are placed around the community and will help notify residents on upcoming clean-up activities on the river. Waste-O could also help achieve SDG#8 (Sustainable Cities and Communities) by helping reduce the amount of burning trash which could ensure a better environment for future generations. Also, with the help of the different tutorials of the app, it could help the residents recycle trash and possibly help the residents create alternative eco-friendly materials. The project could also help achieve SDG#13 (Climate Action) as the app will help users properly segregate and dispose of their trash, with the help of the definitions for different trash, to avoid contributing to climate change and global warming and notify them of possible clean-up activities around the community. Lastly, Waste-O could help achieve SDG#14 (Life below Water) and SDG#15 (Life on Land) by helping the residents make the community a better and cleaner place to live in with the help of the different knowledge given by the app regarding proper waste management, which could not only help them but also animals living on land and below water.

Trailblazing:

The waste-O project could be considered a trailblazing project because it is not like any other information apps about waste management or recycling trash. Typically apps about waste management are recycling apps, one example of which is RecycleNation. It allows users to choose from 15 categories that list more than 2,500 items helping to determine what they can and cannot recycle. It also provides users with a map of nearby recycling locations (Nini, 2018). Even though the app has its feature about examples of recyclable materials, it also has other features that make it unique from most waste management apps. It has features that define different trash (Biodegradable, Residual, and Recyclable), features that show users how to recycle/reuse the different types of trash that residents could see in the community and a calendar feature that could help officials to add a schedule of garbage collection, which other waste management apps don't have.

Feature 1: Creating an Account

Before using the application, users have to choose their respective roles in the community. The app will divide the users into two types, the residents and the officials (Administrators); community officials and the application developers are part of the latter option. Once users have chosen, they can then create their account by signing up. Finally, after creating an account, they can easily login back into the application.

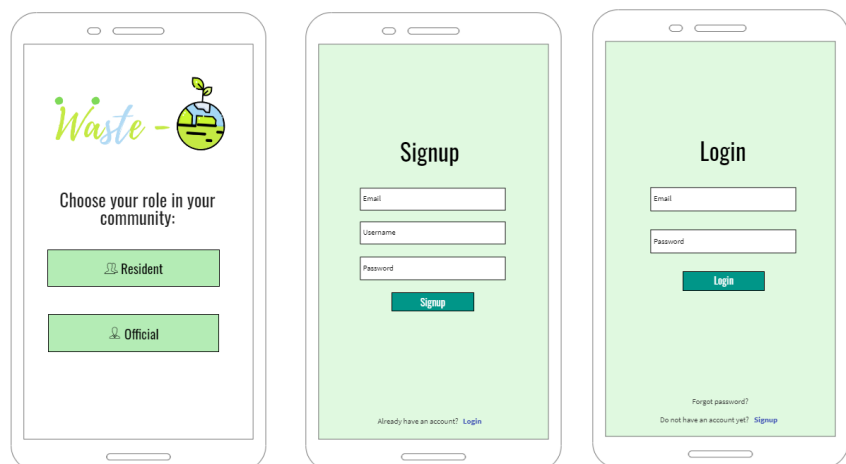


Figure 1. Creating an Account

Feature 2: Home Site

After making an account, the app will direct users to the Home site of the application, where they can see the following: (1) latest announcements made by the developers and officials, (2) what the application is about and its purpose, (3) information about the improper waste disposal problem occurring in their community, and (4) videos and reading articles provided by the application. Users are free to access other features by clicking on the buttons seen at the bottom of the screen. These buttons are labeled Home, Events, Forum, and Users, which have different functions and purposes of serving users and giving them a good experience. Furthermore, a unique circular button at the bottom right of the screen allows users to access the Study Feature/Screen. They can learn new or old, useful information about various types of wastes and waste disposal. Officials and members can add announcements by clicking the “New Announcement” button. They will be directed to a new screen where they have to input the details regarding the announcement, and save it afterwards. Only the members and officials are allowed to add and remove announcements.

Furthermore, users can click on the announcement and read its details.

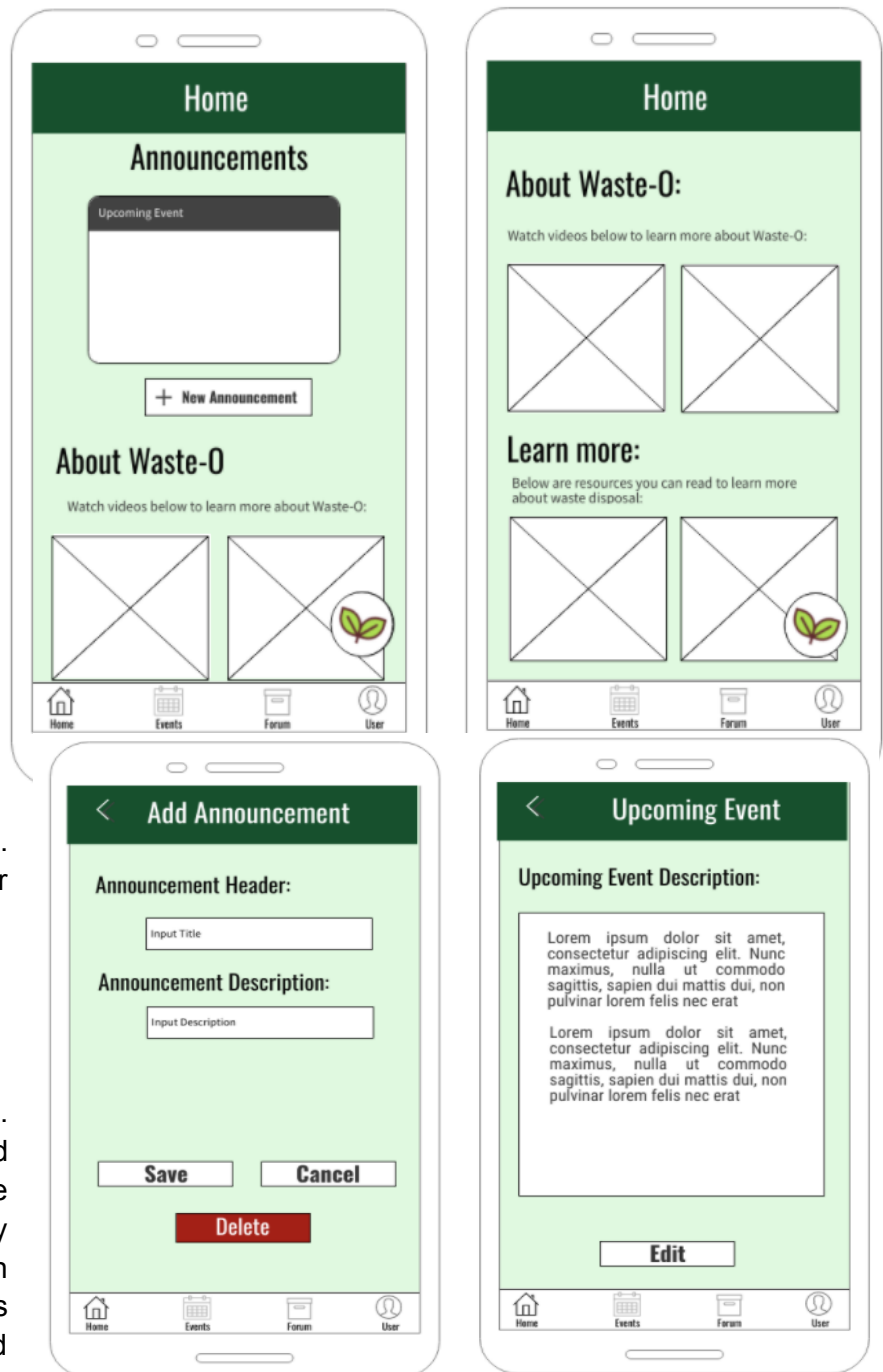


Figure 2. Home A

Feature 3a: Study Information Feature

The information feature allows users to learn about four topics, *Biodegradable Wastes*, *Recyclable Wastes*, *Residual Household Wastes*, and *the Locations of Dumpsites and Junk Shops* within the proximity of the community. When users choose between biodegradable, recyclable, or residual household wastes, the app will redirect them to the selected topic's screens. There will be three more subtopic options, namely, *Definition*, *Impact*, and *Ways to Remember*. For the first subtopic, users will learn about the definition of their chosen topic, for example, Biodegradable Wastes (see images below); in the **Definition** screen, the application will present various information with related images that discusses the definition of the chosen topic. Next is the second subtopic, **Impact**; this lesson is about the harmful effects of improper disposal of the selected waste topic. The app will provide the information and related articles and images for this section to teach users about the importance of proper waste disposal. Lastly, the **Ways to Remember** subtopic will teach users about the different actions they can take to efficiently dispose and maximize the use of the waste they have chosen. The actions they can choose from for each waste vary. For example, in the non-biodegradable waste topic, users will see information about reusing non-biodegradable wastes; however, they would not see this task in the biodegradable waste topic as it is not possible to reuse biodegradable wastes.

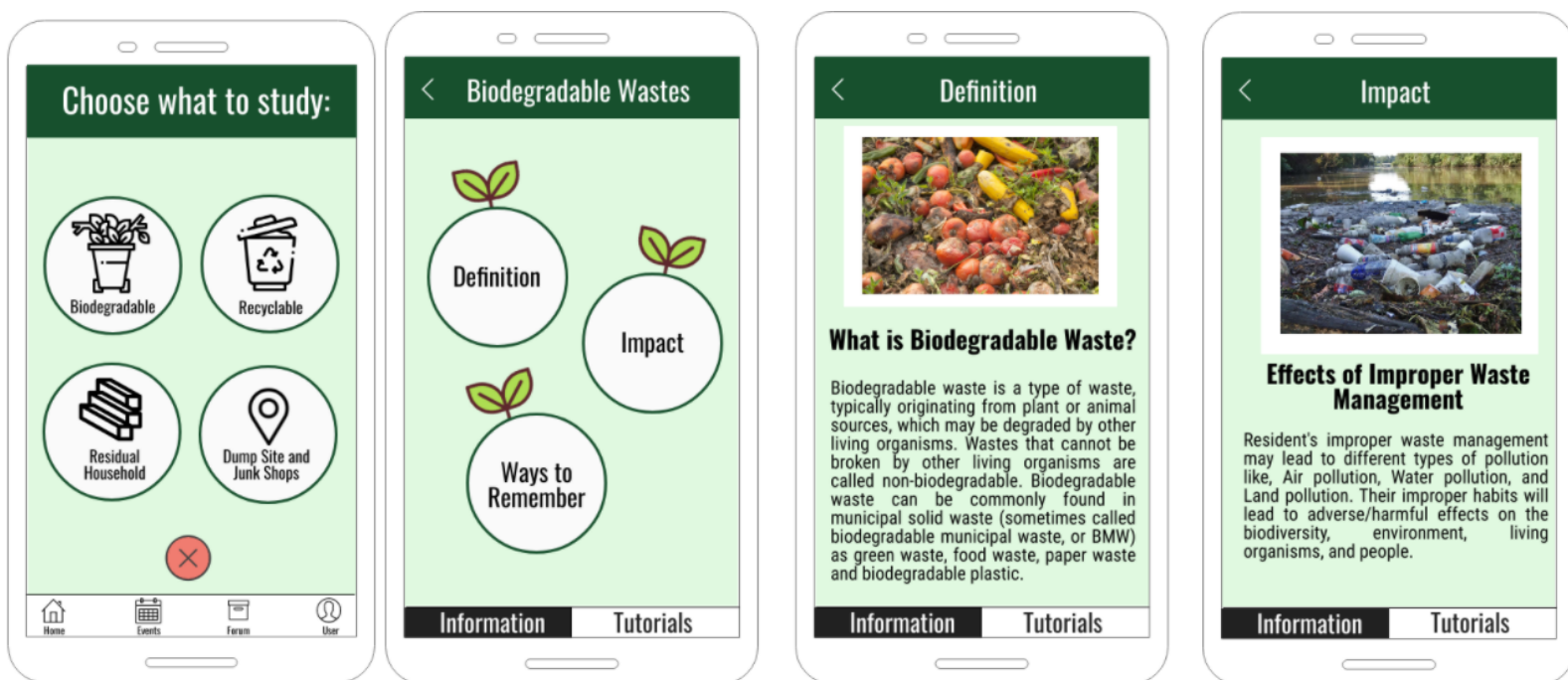
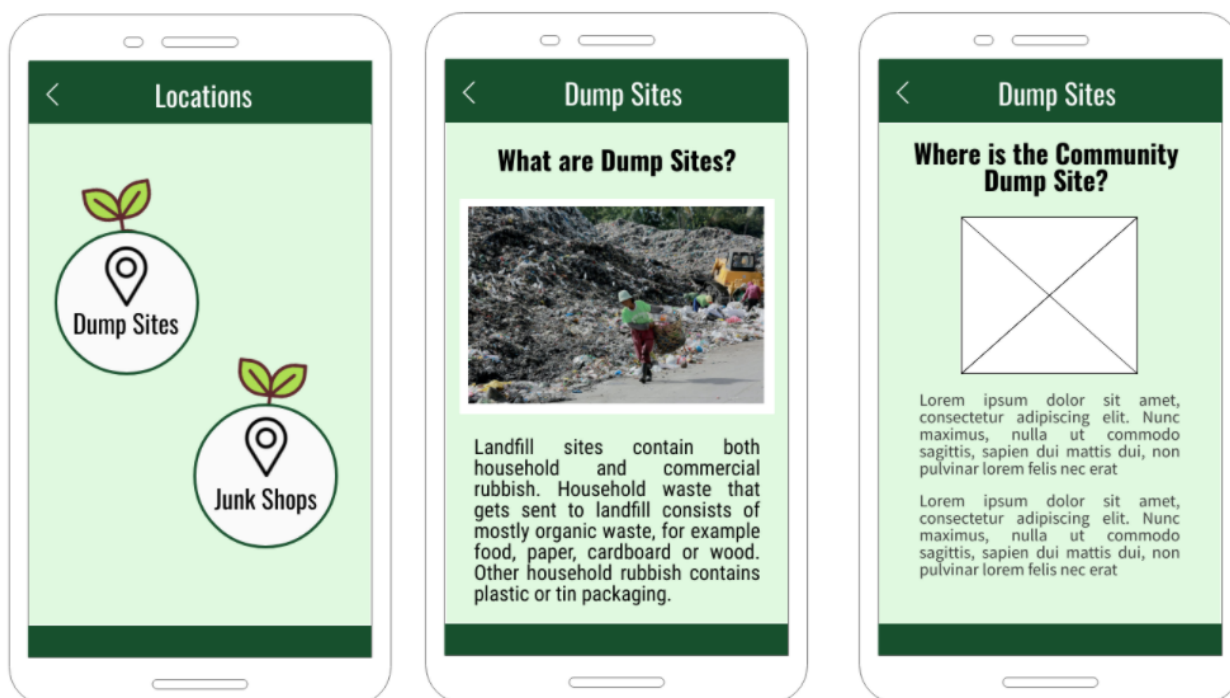


Figure 3 Study A.



Figure 4. Study B.

On the other hand, the topic *Location of Dump Site and Junk Shops* will only have two lessons that discuss the definition and location of the Dump Site and nearby Junk Shops.



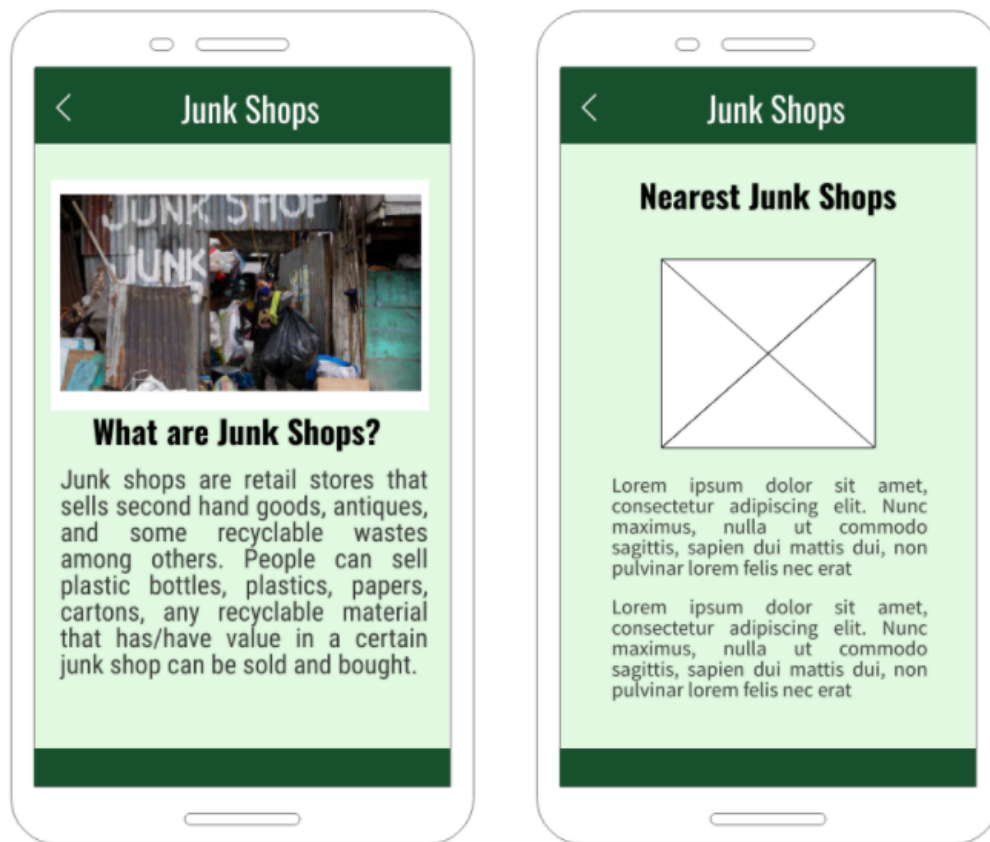


Figure 5. Study C.

Feature 3b: Study Tutorial Feature

The tutorial section of the Study Feature allows users to view different manuals and videos that will teach them detailed actions that they can follow to recycle properly, reuse, reduce, and dispose of their wastes. As seen in the figure below, a filter system distinguishes the different subtypes of trash in their respective category of waste and tutorials. For example, Biodegradable Wastes is the user's chosen category, the filter system's type of biodegradable option will only present the different subcategories of Biodegradable Wastes such as Food wastes, Natural wastes, and others. The user can efficiently save time searching for a specific tutorial for specific trash, like food wastes such as banana peel. The next option also saves the users' time by only presenting the chosen type of tutorial, which may be Videos or Manuals. When the video option is selected, the app will show only video posts and the same for manuals. The videos will come from Youtube, so they can easily watch them by selecting the post on the screen that they want to learn or watch. The app will include the references of these videos as proper etiquette in giving recognition to original creators. Moreover, once users click the manual option, they will be able to access only manual posts, wherein they will have to follow the set of instructions provided in the posts. It is similar to WikiHow instructions, where users can scroll through and learn the steps needed to complete a specific task. As

aforementioned, articles/images/sites will be properly cited at the end of the posts. Another component seen in this tab is the pagination component; this component allows easier access between pages filled with numerous posts provided by developers regarding the chosen waste topics. By clicking the desired page number, users can quickly jump to that section/page of posts.

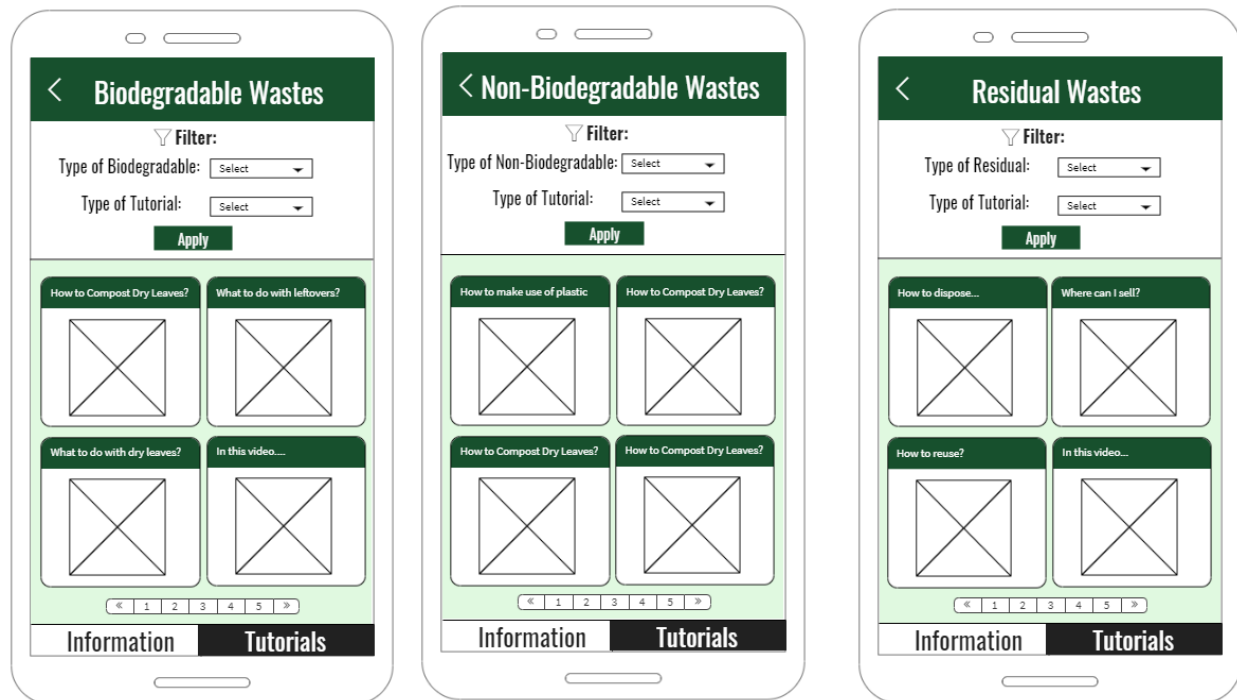


Figure 6. Tutorials

Feature 4: Calendar/Event System

Next is the Calendar feature, in which officials may use the Calendar function to set dates for events or schedules and notify the users when to put their trash outside to be collected. It will allow users to keep track of important dates set by the officials and regularly scheduled activities such as the garbage collection schedule. Most importantly, this enables the residents of the community to be punctual at all times. The screens that resident-type users will see will be different from the official type users. As mentioned above, only officials are allowed to set and manage events in this feature with the help of a button; however, in the resident type users' screen, a button for setting events will not be displayed. Resident type users are only restricted to visit and view the community events posted or set by the officials.

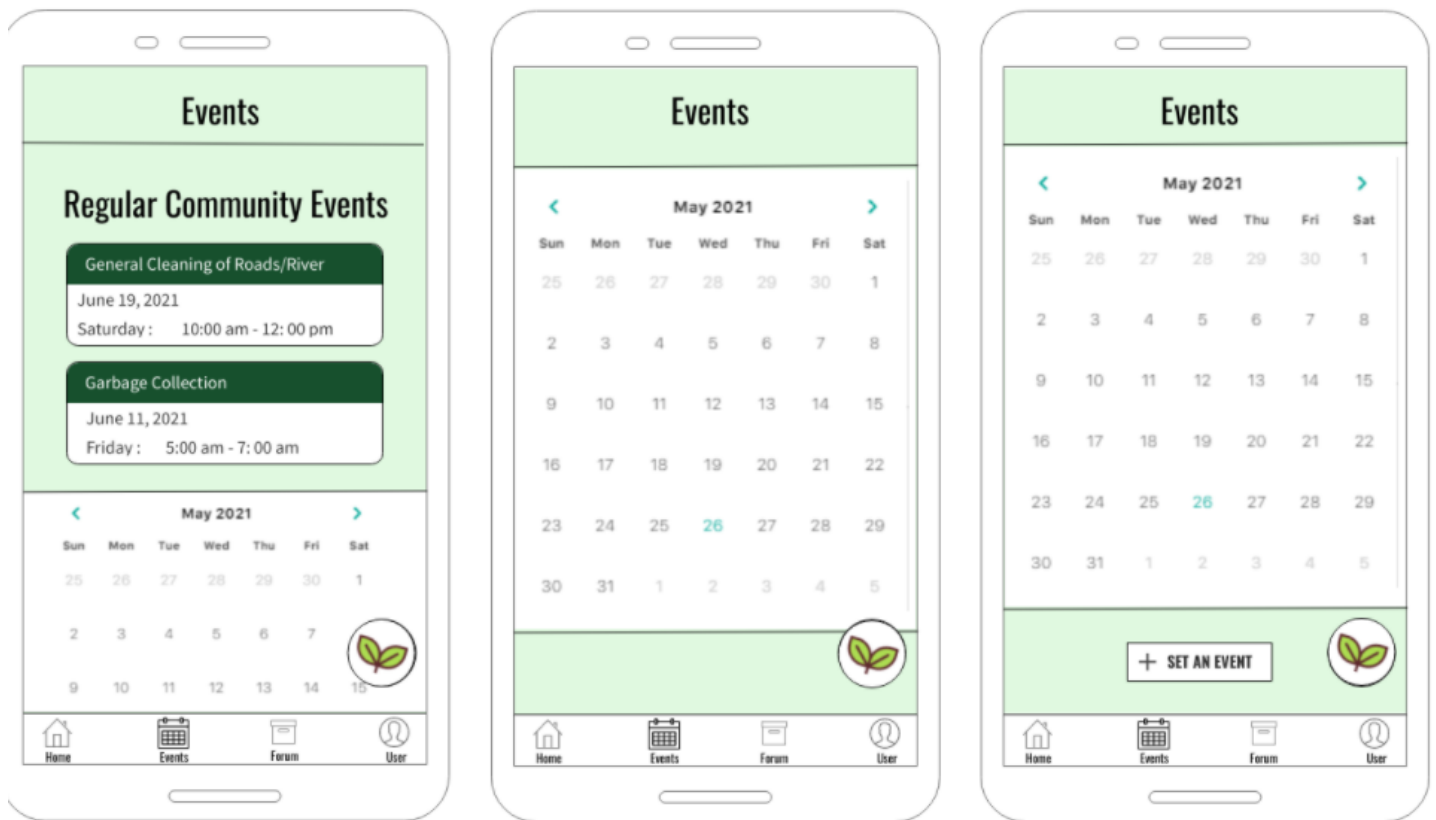


Figure 7. Events

Officials can set an event by clicking on the button provided at the bottom of the Event screen. They will be required to input the start date and time, end date and time of the event, and the title and description of the event. Once done, they can click apply to post and set the event in the Calendar and Event Screen or click cancel to remove changes/the event. When officials post or set new events, these events will be displayed to every user in the application, therefore, easily spreading awareness and information about upcoming events. If an event has ended, officials can delete the event by clicking it in the Calendar or the post in the Regular Community Events Section. Then, pressing the delete button will remove it altogether. When officials delete an event, all users will not see and access it anymore until they post a new event.

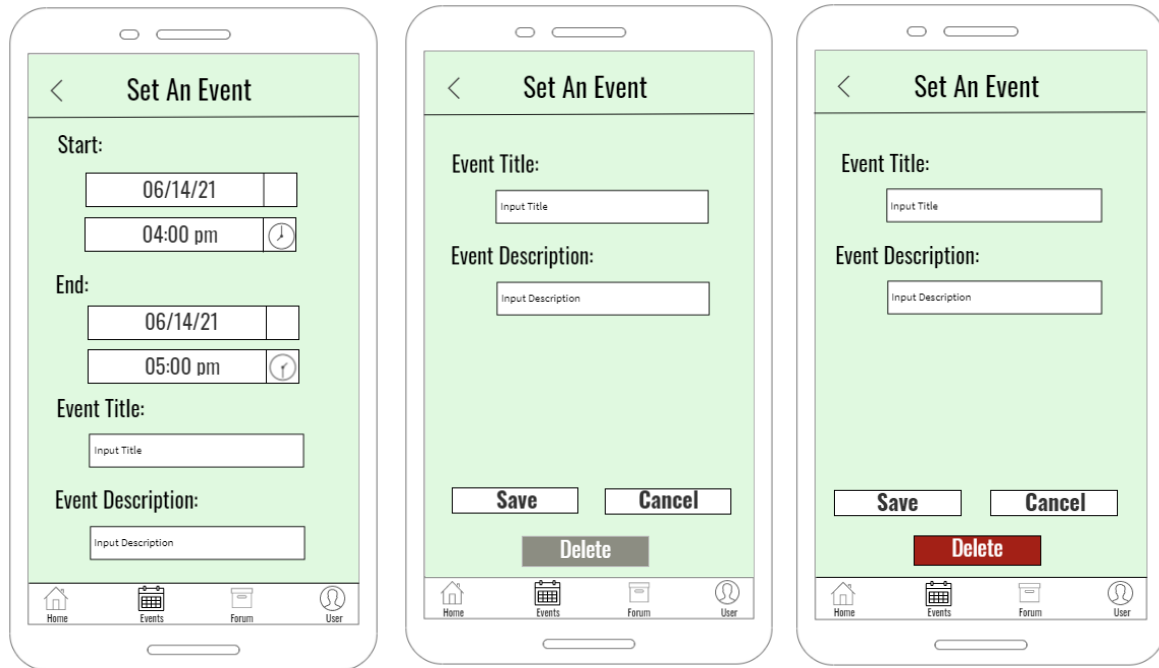


Figure 8. Setting of Event

Feature 5: General Forum

This feature will allow users to report issues/concerns to an official member of the development team. Users are allowed to message a feedback account of one of the developers. The administrator is responsible for responding to concerned users; the issue raised and the administrator's answer will appear in the general forum section. This post will have the question as its header, and the contents will be the answers/summarized discussion between the administrator and the user that raised the issue. The app will not include their names in the posts in the forum; therefore, they will remain anonymous.

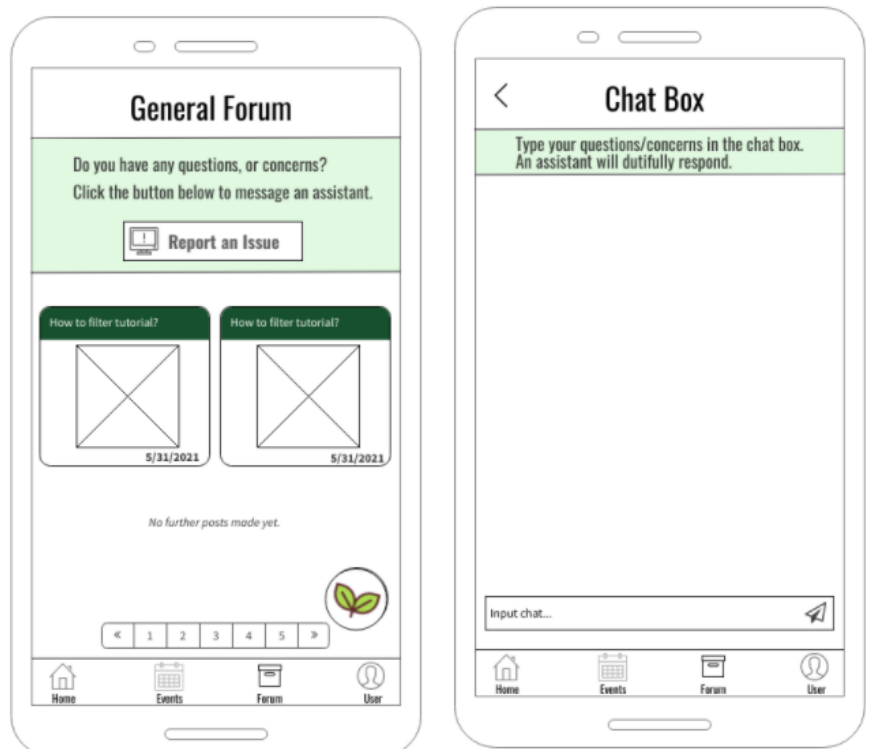


Figure 9. General Forum

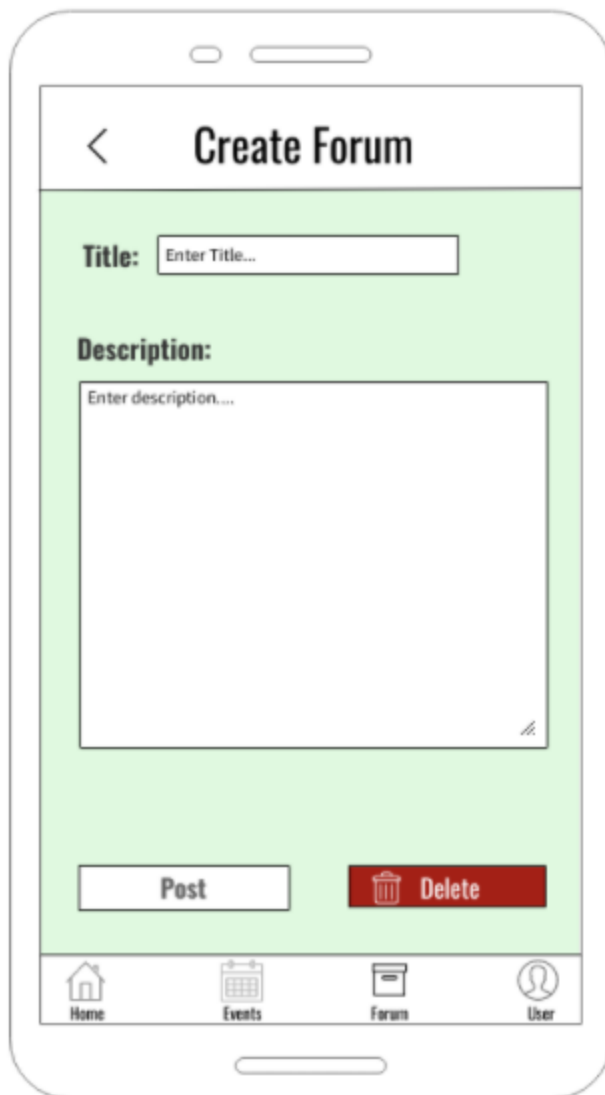


Figure 10. Creating forum

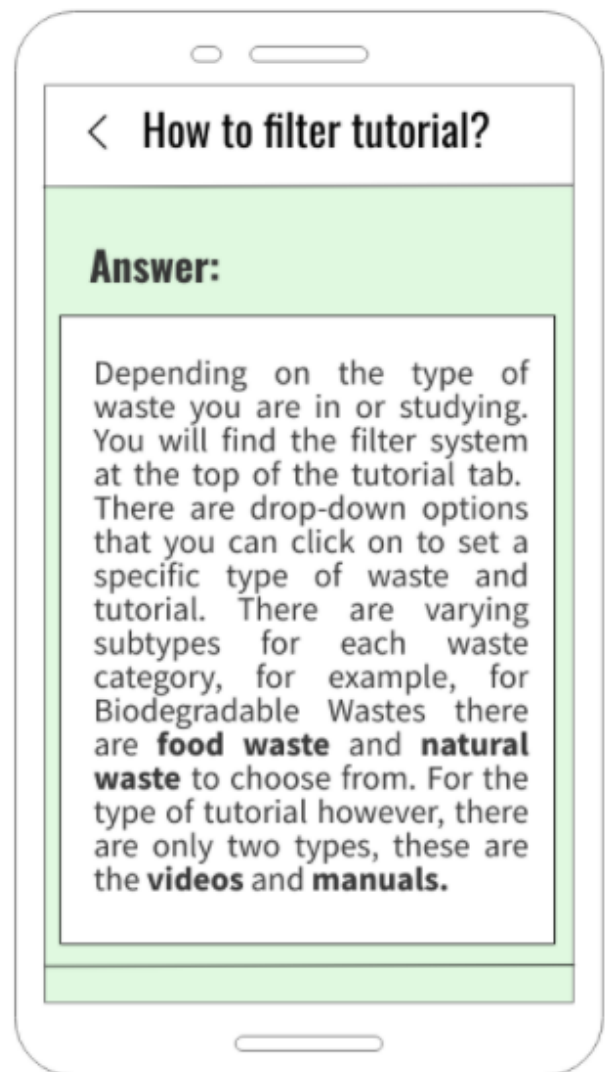


Figure 11. Viewing Forum Post

Feature 6: User Profile

Users are able to modify their user profile by clicking on the User button on the tab. Here, they are free to change their profile picture with their own uploaded pictures. They will be able to view their usernames, and access the settings of the applications in this screen. Clicking on the settings will lead the user to a screen where they can learn about the terms and conditions, policies, and the development team. Next, they can turn off or on the notifications, mainly push and email notifications. If such notifications are turned on, they will receive certain updates made in and outside of the application. Additionally, users can rate the app by clicking the stars displayed; rating 1-5 stars having 1 as the lowest rating and 5 as the highest rating.

Lastly, the contact information of the leader of the group and leader of the development team will be displayed for the users' convenience in case they have queries or issues.

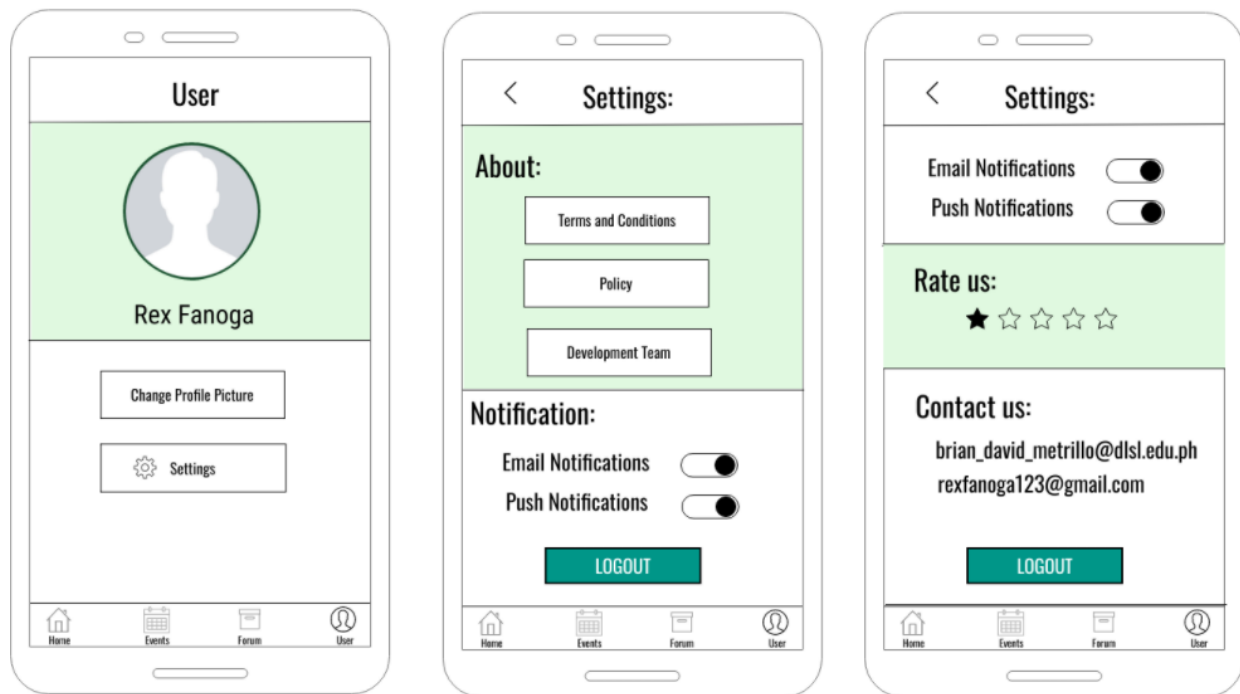
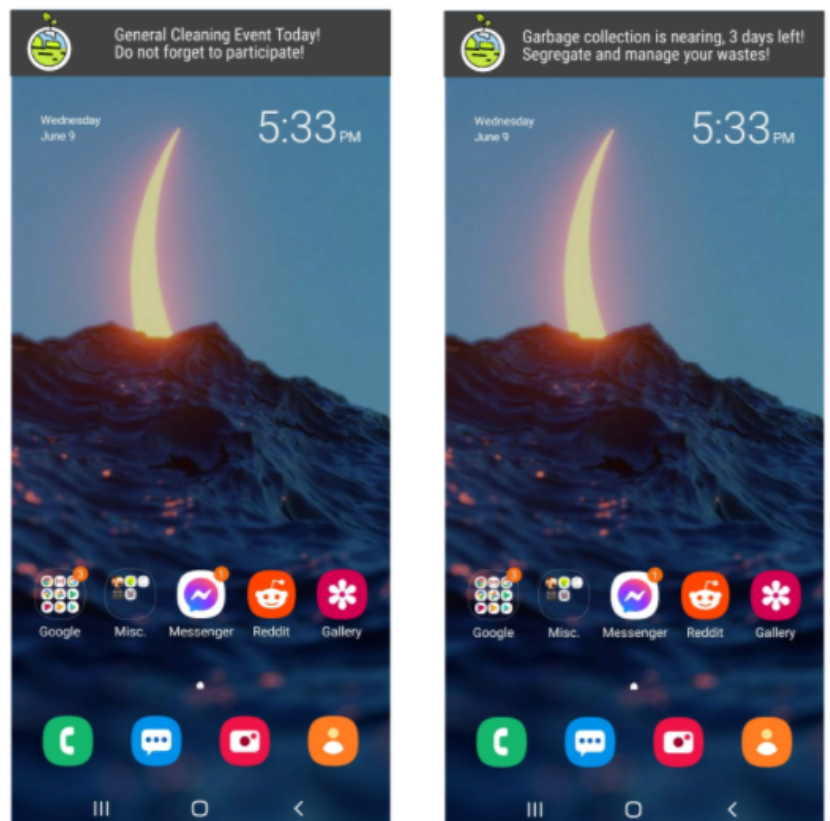


Figure 12. Users Profile Access

Feature 7: Reminder Notifications

To keep users up-to date, Waste-O will make push notifications whenever:

1. A new announcement or event is created.
2. There are three days left before the garbage collection.
3. An event is to take place on the current day.
4. There is an update for the app.
5. The user has been inactive for a week.



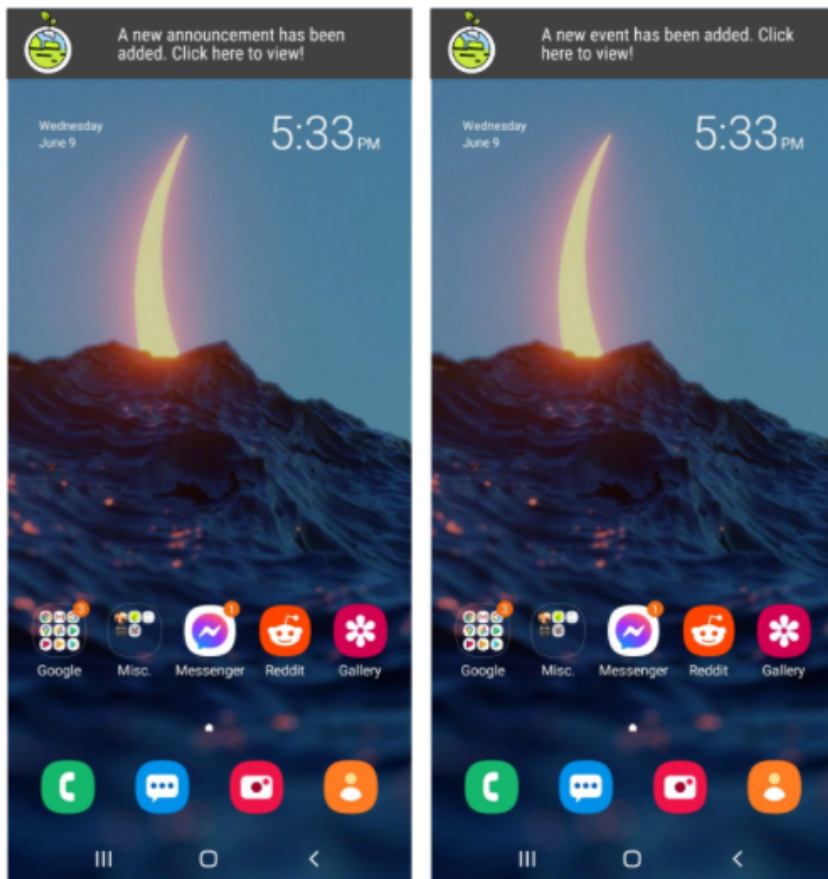


Figure 13. Reminders

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