# ****EcoHome – Student-Led Recycling and Waste Management Web Application****

### **Summary**

### **EcoHome is a web application created by students to help promote recycling and effective waste management at school and in homes. The aim is to design a program whereby students and other users learn about waste separation, log identifiable recyclables, and gain eco-points through game-like features. The application contains a recycling tracker, educational materials, and a report admin dashboard to manage users and report analytics. Users can access it in class and at home as it is responsive and mobile-friendly. It inspires users to adopt sustainable habits and to constructively engage in environmental improvement.**

### **Project Overview**

### **Objectives**

### **Design a web application intended to promote recycling and environmental protection for school students.**

### **Inform users about waste separation and recycling procedures.**

### **Implement a feature that enables users to report the environmental problems of the area, such as overflowing bins or illegal dumping.**

### **Users can earn eco-points, level up, and compete in friendly rankings.**

### **Ensure that users can access the application on mobile devices and PCs, at school or home.**

### **Scope and Limitations**

#### **Scope**

The app will include:

A recycling tracker for logging recyclable items and earning eco-points.

An educational hub with guides and tips about waste segregation.

An admin dashboard for teachers and eco-student leaders to manage reports and users.

Notifications for updates and environmental alerts.

#### ****Limitations****

The reward system will be limited to school-wide implementation for now.

The app is designed for mobile use but may not work on older devices or offline.

Future updates may include expansion to barangay-level programs and real-time data features.

## ****Literature Review****

Projects like **Eco-Schools** and **EcoBricks** show how student-led environmental programs can make a big impact. Apps like **Recycle Nation** and **iRecycle** help users find recycling info and locations. Research also shows that gamification—using points, badges, and leaderboards—can increase user engagement in eco-related apps.

For this project, we chose to use **HTML**, **CSS**, and **JavaScript** for the frontend, and **Firebase** or **JSON** for backend data. These tools are simple, free, and effective for student developers

**Literature Review**

The importance of trash management and recycling has increased dramatically in the modern context of environmental sustainability. This chapter explores the proactive role that students have in leading programmes that focus on recycling and trash management. The chapter begins with an examination of the many waste typologies, which include hazardous, inorganic and organic categories. This gives readers a basic grasp of the waste environment. Additionally, the chapter describes several waste management strategies, from conventional ones like burning and landfilling to cutting-edge ones like anaerobic digestion and composting. The growing problem of managing electronic waste is given special attention, highlighting how crucial it is to handle electronic garbage appropriately in the digital era. A thorough analysis of recycling, which explains the complex procedures involved in converting waste materials into useful resources, forms the core of the discussion. The chapter also explains how students may actively support recycling and garbage management by organizing educational campaigns, involving the community, and coming up with creative solutions, which will help to cultivate a culture of resource conservation and environmental responsibility.

System Design

Requirements

* **User Authentication** – Secure login for students and admins.
* **Location-Based Services** – Map view of donation and recycling bin locations.
* **Admin Dashboard** – For managing users, reports, and eco-points.
* **Eco-Points Tracking System** – Logs student contributions and rewards.
* **Donation Map View** – Displays school-based donation drop-off points.

Functional Requirements

Students can:

* + View donation and recycling bin locations.
  + Log recyclable items and earn eco-points.
  + Receive notifications about events and updates.

Admins (teachers and eco-student leaders) can:

* + Manage users and monitor eco-points.
  + Post announcements and event details.
  + Review and respond to environmental reports.

**Users**

* **Students** – Earn eco-points for participating in recycling and reporting issues.
* **Admins** – Teachers and student leaders who manage the system and oversee activities.

Must-Have Features

* Responsive user interface for smooth access on school computers and mobile phones.
* App should load in under 3 seconds for optimal performance.
* Secure authentication system using Firebase to protect user data and access levels.

## **Project Rationale**

### **Problem Statement**

Improper waste disposal and lack of awareness about recycling remain persistent issues in schools and households. Many students and community members are unfamiliar with proper waste segregation practices, leading to increased pollution, health risks, and missed opportunities for environmental education. Additionally, there is no centralized digital platform that encourages student participation in eco-friendly activities or tracks their contributions to sustainability efforts.

### **Solution Overview**

The proposed solution is **Ecohome**, a student-led recycling and waste management web application designed to promote environmental awareness and responsible waste disposal. The application provides:

* **Recycling Tracker** – Allows users to log recyclable items and monitor their eco-points.
* **Donation Locator Map** – Displays nearby recycling bins and donation centers using static map data.
* **Eco Calendar** – Lists upcoming clean-up drives, recycling events, and workshops.
* **Educational Hub** – Offers guides and resources on waste segregation (biodegradable, non-biodegradable, recyclable).
* **Gamification Features** – Includes a reward system and leaderboard to motivate student participation.
* **Admin Dashboard** – Enables eco-student leaders and teachers to manage reports, users, and event data.

The application is built using HTML, CSS, and JavaScript, with Firebase or JSON for backend functionality. It is designed to be responsive and accessible across desktop and mobile devices.

### **Community Benefit**

Ecohome empowers students to take an active role in environmental protection by providing a digital space for learning, tracking, and collaboration. It fosters a culture of sustainability within schools, encourages responsible waste management habits, and strengthens community engagement through shared eco-initiatives. By making recycling more visible, interactive, and rewarding, the project contributes to long-term behavioral change and supports the development of environmentally conscious citizens.

# ****EcoHome – Student-Led Recycling and Waste Management Web Application****

**Summary**

EcoHome is an eco-friendly web application created by students with the aim of encouraging recycling and waste management in school and at home. The aim is to have a platform where users, particularly students, are educated on segregation of wastes, track recyclables, and earn themselves eco-points from gamified modules. The application has a recycling tracker, learning materials, and an admin panel for reporting and user management. It is made to be responsive and mobile-friendly as well as desktop-friendly, so you can use it anywhere, be it at home or in class. EcoHome fosters environmentally conscious habits and proactive engagement in green initiatives.

**Project Overview**

**Objectives**

Develop a friendly-to-students recycling web application that raises environmental awareness.

Deliver educational materials on waste segregation and recycling best practices.

Enable users to report environmental problems such as full bins or unauthorized dumping.

Implement gamification to encourage users via eco-points and leaderboards.

Ensure the application operates well on both smartphones and laptops, in school or at home.

**Scope and Limitations**

**Scope**

The app will have:

A recycling tracker to record recyclable products and gain eco-points.

An educational portal with tutorials and tips on waste segregation.

An admin dashboard for teachers and eco-student leaders to monitor reports and users.

Environmental reminders and updates notifications.

**Limitations**

The reward system will be implemented school-wide at this point.

The app is mobile-based but not necessarily on older devices or offline.

Future releases could expand to barangay-level programs as well as real-time data features.

**Literature Review**

Initiatives such as Eco-Schools and EcoBricks demonstrate the potential of student-initiated environmental initiatives. Apps such as Recycle Nation and iRecycle allow users to find recycling information and locations. Research further indicates that gamification—using points, badges, and leaderboards—can drive user engagement in green-related apps.

For this project, we decided to use HTML, CSS, and JavaScript for the frontend, and Firebase or JSON for back-end data. These technologies are easy, free, and efficient for student developers

The importance of trash management and recycling has increased dramatically in the modern context of environmental sustainability. This chapter explores the proactive role that students have in leading programmes that focus on recycling and trash management. The chapter begins with an examination of the many waste typologies, which include hazardous, inorganic and organic categories. This gives readers a basic grasp of the waste environment. Additionally, the chapter describes several waste management strategies, from conventional ones like burning and landfilling to cutting-edge ones like anaerobic digestion and composting. The growing problem of managing electronic waste is given special attention, highlighting how crucial it is to handle electronic garbage appropriately in the digital era. A thorough analysis of recycling, which explains the complex procedures involved in converting waste materials into useful resources, forms the core of the discussion. The chapter also explains how students may actively support recycling and garbage management by organizing educational campaigns, involving the community, and coming up with creative solutions, which will help to cultivate a culture of resource conservation and environmental responsibility.