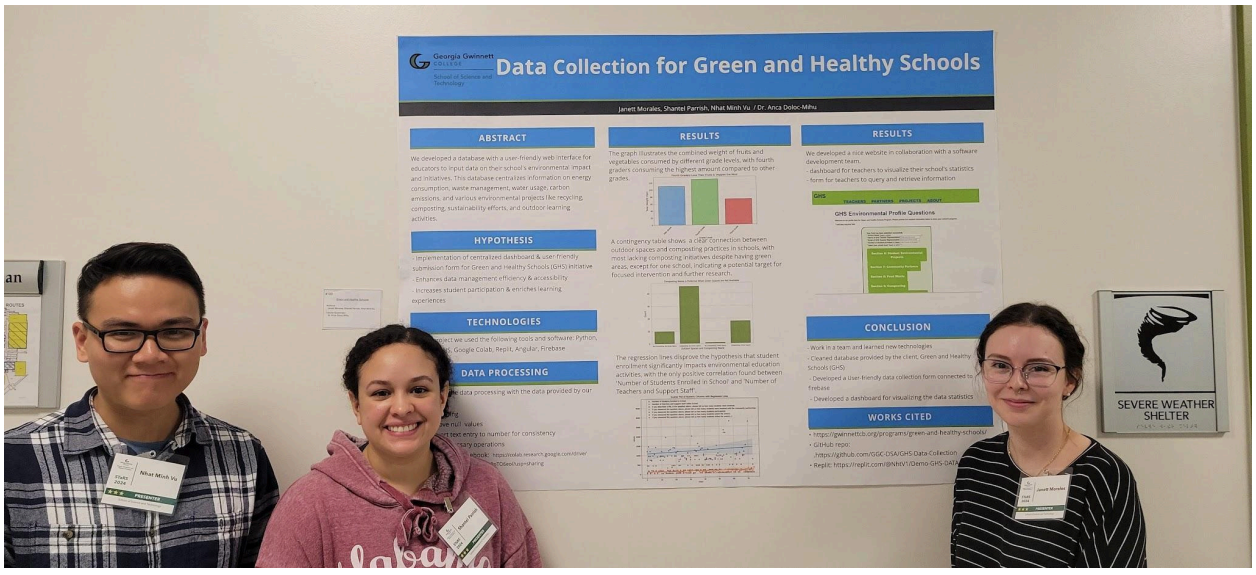
Final Report

Project Description

The team has created a user-friendly web interface and database for educators to input data on their school's environmental efforts. Currently, Green and Healthy Schools (GHS) relies on a yearly Google Form, which can lead to data inaccuracies and missing information. To improve this, teachers will now submit data quarterly, with optional, collapsible sections to streamline the process. The database stores a variety of information, including narratives, photos, and videos, on energy use, waste management, and eco-friendly projects like recycling and composting. Additionally, a dynamic dashboard presents statistical analyses for accurate presentations to the education board and stakeholders. Targeting teachers and staff, the project aims to encourage more frequent and accurate submissions, potentially leading to increased funding and support. Using Firebase as the database and HTML/CSS for the web page, real-time updates are possible. Future plans include expanding the database for more inputs, adding filters to the dashboard, and incorporating media file submissions organized by project category for easier access by administrators.

Team Members



(Left to Right) Nhat Vu, Shantel Parrish, and Janett Morales

Client Presentation

The client is Gwinnett Clean & Beautiful (GCB). It is a nonprofit organization established in 1980, dedicated to fostering a hyper-local, environmentally conscious movement in our community. Affiliated with Keep America Beautiful, it empowers individuals to take action for the betterment of our cities, environment, and county. Guided by a Citizen's Advisory Board of esteemed leaders, the organization focuses on education, partnerships, individual responsibility, and volunteer action to create economically sound, environmentally healthy, and socially connected communities.

In collaboration with Gwinnett County Public Schools (GCPS), GCB leads the Green and Healthy Schools (GHS) Program. This initiative integrates environmental education into school curricula, fostering problem-solving skills, civic engagement, and green career pathways. Participants benefit from engaging in environmental problem solving, accessing mini grants for projects, connecting with community partners, and receiving recognition for their efforts. Together, GCB and the GHS Program exemplify the spirit of community, environmental stewardship, and collective action, inspiring positive change for generations to come.

Team Plan

Sprint 1:

- Collect project requirements from client to ensure a clear understanding of the project scope and objectives
- Conduct project planning activities, including task assignment, timeline creation, and resource allocation
- Gather and clean data necessary for the project, ensuring its quality and integrity
- Develop a draft version of the web-based form to collect data from educators
- Research and configure a suitable database solution to store the collected data securely

Sprint 2:

- Finalize the design and functionality of the web-based form based on client feedback and requirements
- Update code and database configurations to optimize performance and ensure compatibility
- Collaborate with the software development team to integrate the form with existing system/platform
- Merge code with the software development team's repository to streamline collaboration and version control
- Focus on web design to enhance the user experience and visual appeal of the interface
- Develop tools for data analysis to extract meaningful insights from the collected data

Sprint 3:

- Address any issues or bugs related to collapsible sections in the web-based form, ensuring smooth functionality
- Incorporate client feedback to update and improve the dashboard, enhancing it usability and relevance
- Integrate the updated dashboard into the website to provide staff with easy access to project insights
- Ensure the web-based form is fully functional and connected to the database, allowing educators to submit data seamlessly

Roles

Nhat Vu

1. *Data Analyzer*
2. *Project Documentation*

Shantel Parrish

1. *Data Modeler*
2. *Client Liaison*

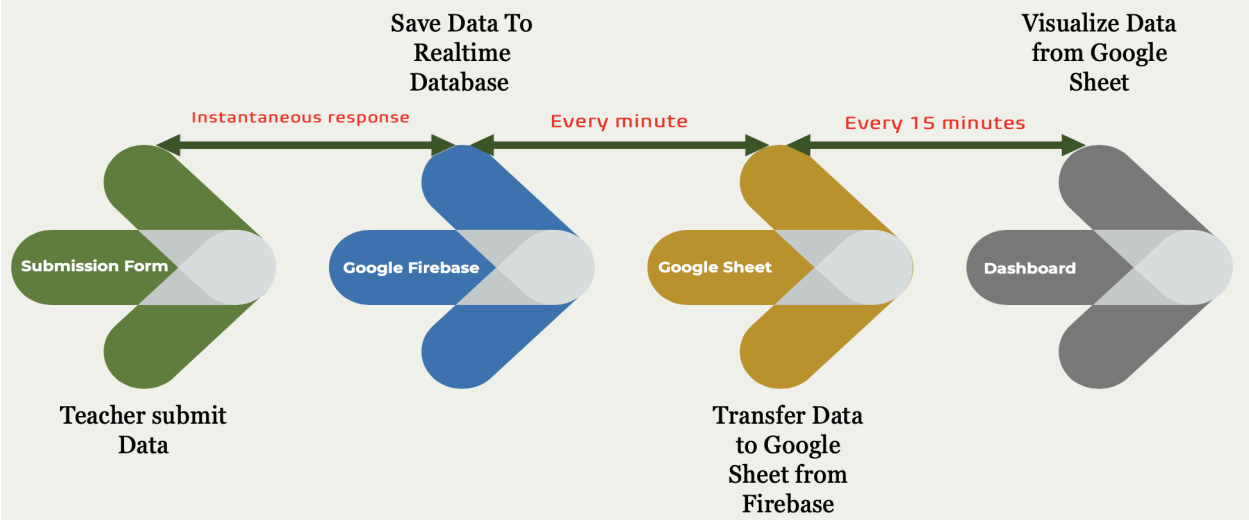
Janett Morales

1. *Team Manager*
2. *Visualization*

Technologies Used

1. JIRA
2. Replit
3. Node
4. Firebase
5. Angular
6. OneDrive
7. Google Colab
8. Visual Studio Code
9. Github

Flow Chart



Collections

1. GitHub
2. Demo Video
3. Colab
4. Website

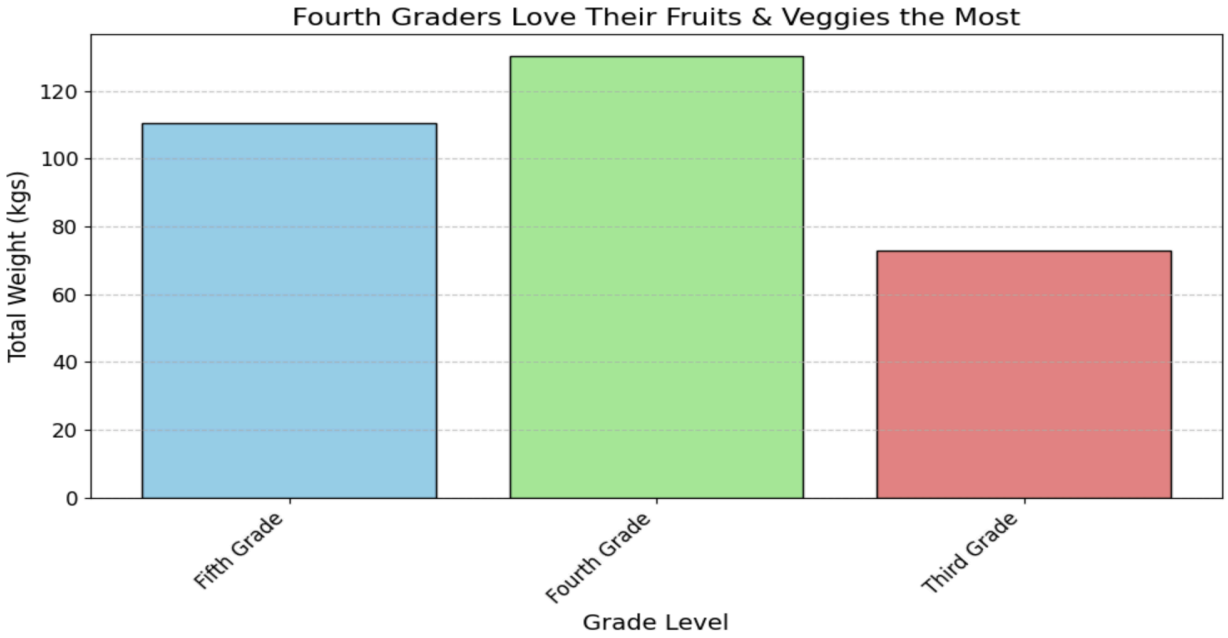
Methods and Results

Main Methods:

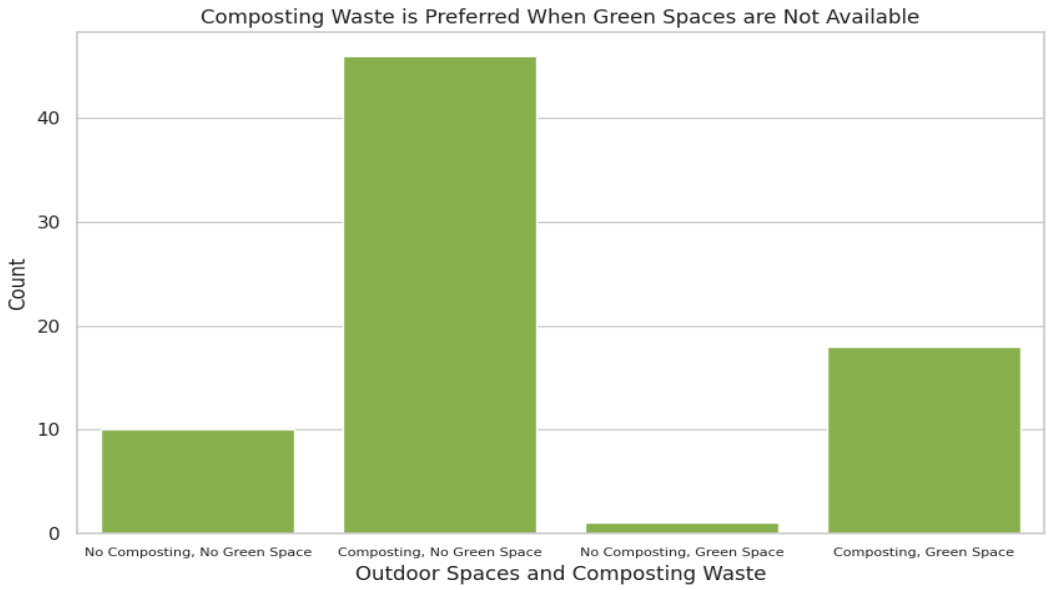
1. Data Processing: Preprocessed the raw data collected from schools to prepare it for analysis
    - Removed any duplicate or null values to ensure data quality
    - Converted categorical variables into numerical formats
    - Other necessary operations
2. Exploratory Data Analysis: Conducted exploratory analysis to gain insights into the relationships and patterns within the dataset
    - Created plots and charts to visualize distributions, correlations, and trends in the data
    - Calculated summary statistics to describe the characteristics of the data
3. Correlation Analysis: Investigated correlations between different variables to identify potential relationships and dependencies
    - Calculated correlation coefficients to measure the strength and direction of linear relationships between pairs of variables
    - Generated a correlation matrix to visualize the correlations between multiple variables simultaneously
4. Regression Analysis: Conducted regression analysis to analyze the relationship between student enrollment, staff numbers, and environmental education activities
    - Fitted linear regression models to explore the association between enrollment, staff numbers, and environmental education activities
    - Evaluated model assumptions and checked for outliers, multicollinearity, and heteroscedasticity
5. Contingency Table Analysis: Used contingency tables to analyze the relationship between outdoor spaces and composting practices in schools
    - Applied chi-square tests to determine if there was a significant association between outdoor spaces and composting practices
    - Examined the distribution of schools across categories of outdoor spaces and composting practices to identify patterns and trends

Results:

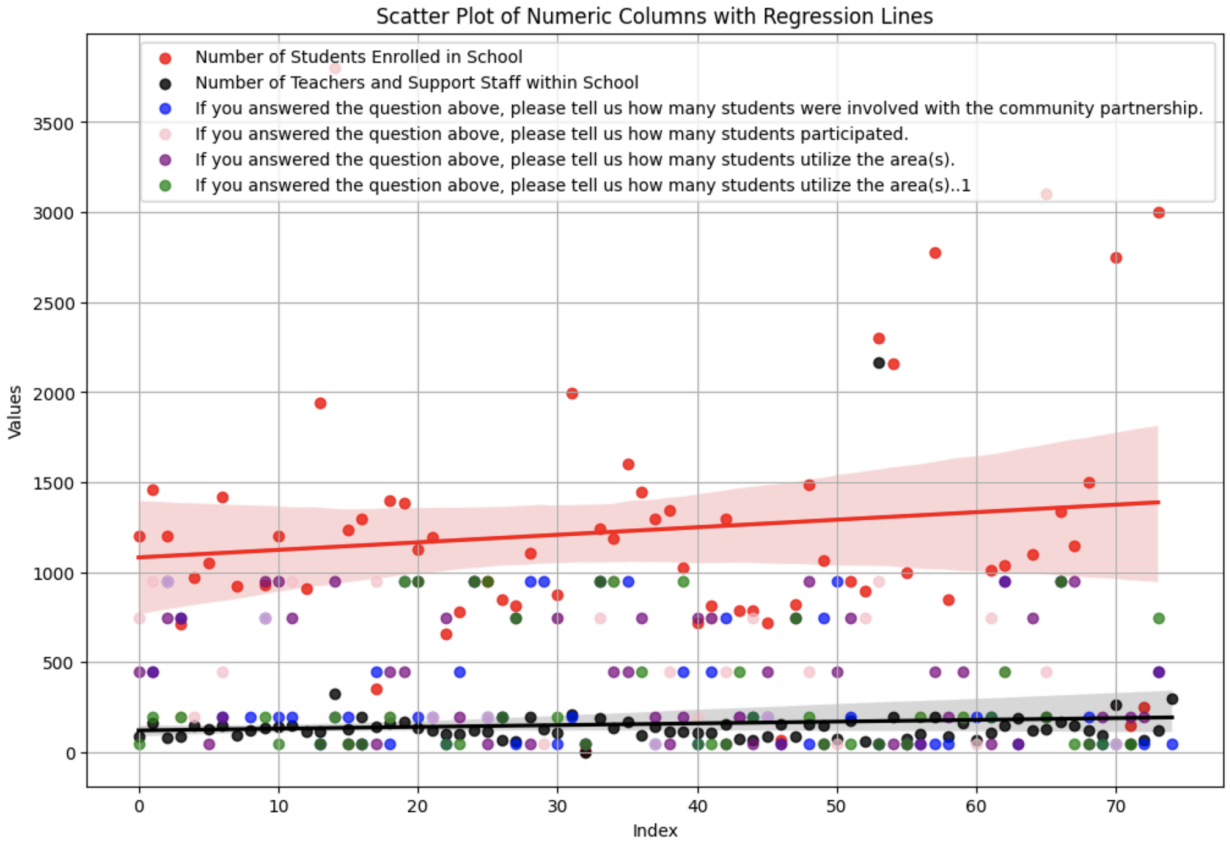
Result 1: The graph shows that fourth graders consume the highest amount of fruits and vegetables compared to other grades, indicating potential trends in dietary habits among different age groups.



Result 2: The contingency table reveals a clear connection between the presence of outdoor spaces and composting practices in schools. Most schools lacking composting initiatives have green areas, except for one school, suggesting a potential target for focused intervention and further research.



Result 3: The regression lines disprove the hypothesis that student enrollment significantly impacts environmental education activities, with the only positive correlation found between 'Number of Students Enrolled in School' and 'Number of Teachers and Support Staff'.

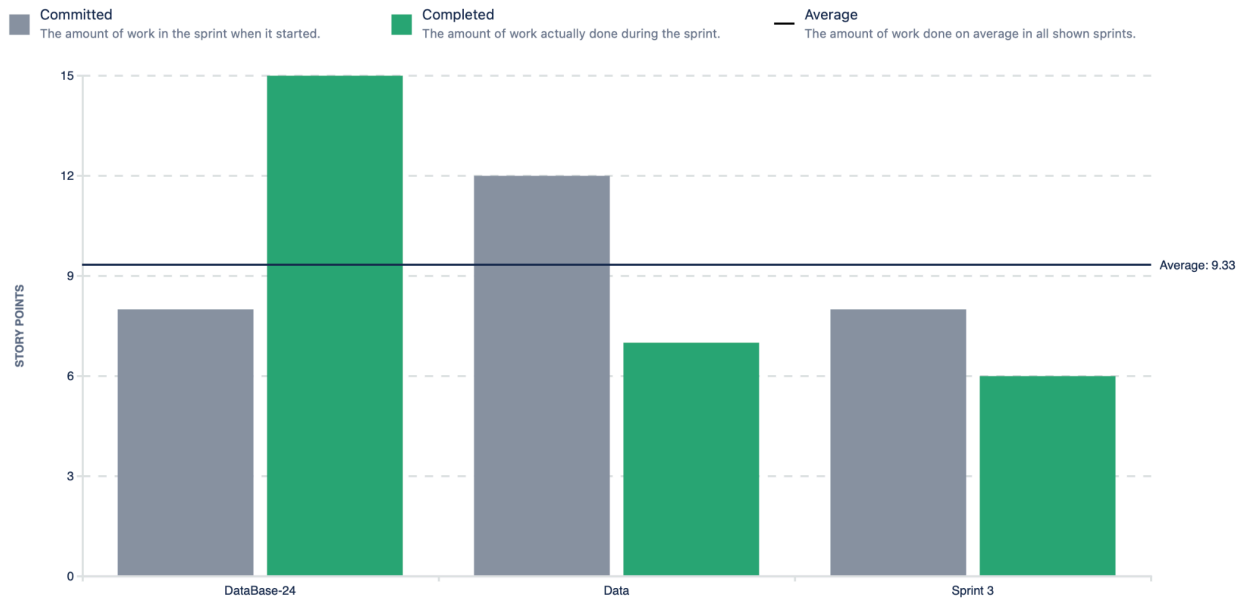


Github Repo Link and Deployed Project

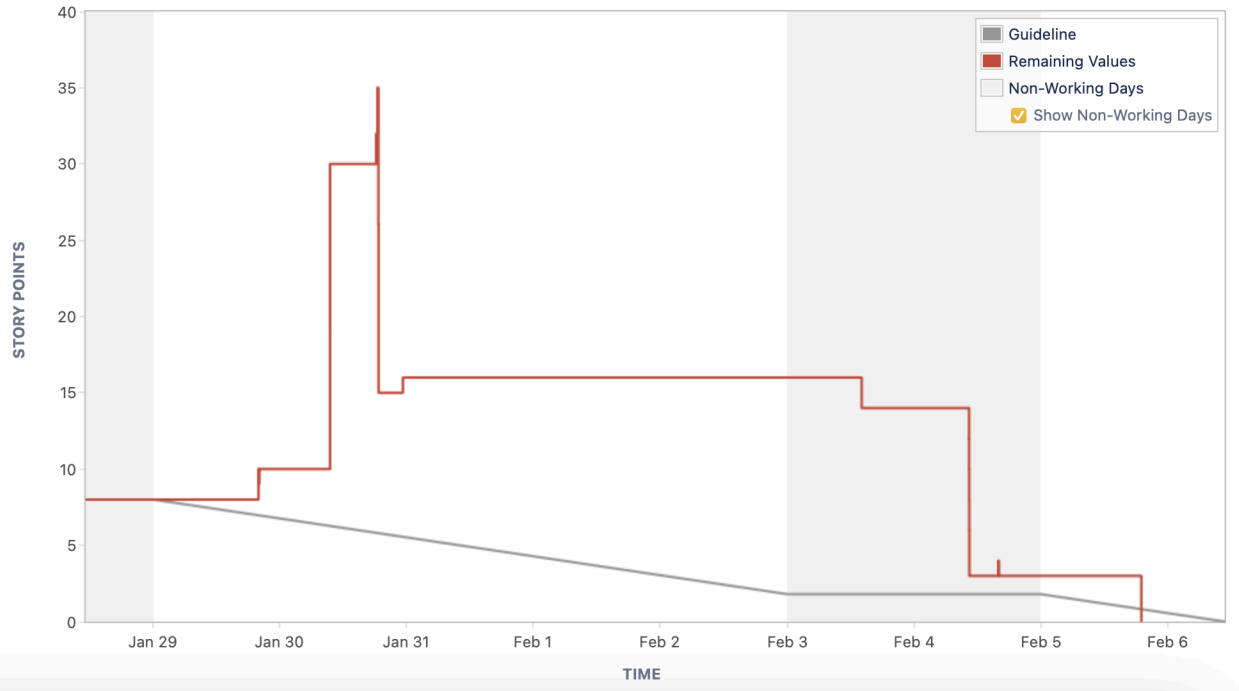
This is the link to the Github repository.
This is the link to the deployed project website.

Jira Dashboard

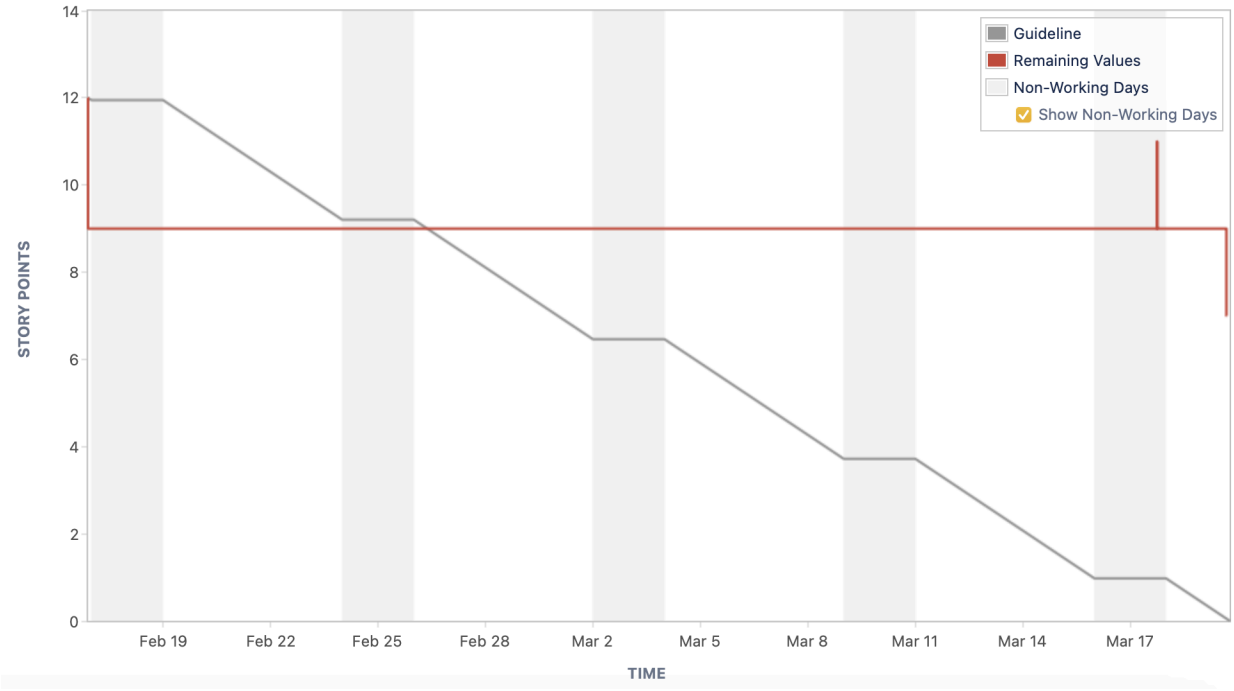
Overall Velocity:



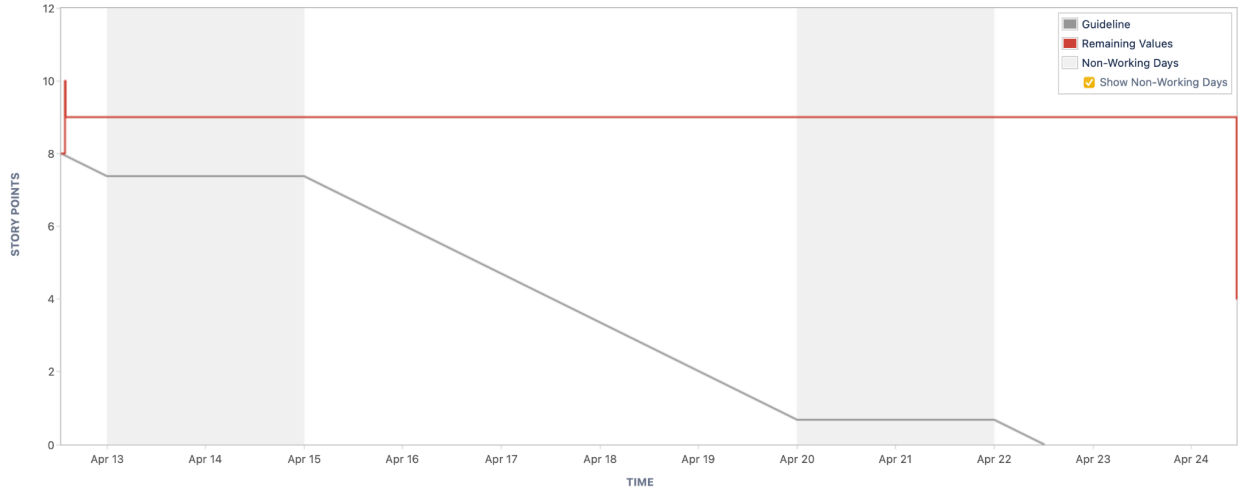
1st Iteration Burndown Chart:



2nd Iteration Burndown Chart:



3rd Iteration Burndown Chart:



Screencast Demo

This is the link to the demo video

List of Features Implemented

1. User-Friendly Web Interface: Developed a user-friendly web interface for educators to input data regarding their school's environmental footprint and initiatives.
2. Comprehensive Database: Created a comprehensive database to store narratives, links to photographs and videos, and participation records related to energy utilization, waste handling, water consumption, carbon footprint, and eco-friendly projects.
3. Real-Time Data Updates: Implemented real-time data updates, allowing for seamless integration and synchronization of data between the database and the web interface.
4. Dynamic Dashboard: Integrated a dynamic dashboard to present statistical analyses and insights derived from the database, providing stakeholders with actionable information on environmental education activities and initiatives.
5. Automated Statistics Updates: Developed functionality to automatically update useful statistics on the dashboard at regular intervals, ensuring stakeholders have access to timely insights into environmental trends and activities.
6. Google Sheet Integration: Linked a Google Sheet to the database for viewing raw data and facilitating data management tasks, providing administrators with additional flexibility and control over data manipulation and analysis.

List of Known Issues

1. Database Expansion: The current database solution, Firebase, only supports 1GB of data, which may not be sufficient to handle the increase in submissions expected with the expansion of the project. As more data is added to the database, it may exceed the storage limits imposed by the Firebase free plan, leading to potential data loss or service disruption.
2. Dashboard Expansion: The team is working with a previous dataset before the implementation of the new data form which caused inconsistent data. This inconsistency poses challenges when creating filters for the expanded dashboard,as data may be incomplete or structured differently. This

inconsistency leads to difficulties in accurately filtering and visualizing the data, impacting the current usability and effectiveness of the dashboard.

3. Integration with Angular Web Application: The team is unable to link the database to the web application developed in Angular, ensuring seamless data retrieval and synchronization between the database and the user interface.
4. Connection of Database to Angular Web Application: The team is unable to link the dashboard directly to the web application to provide users with access to statistical analyses and insights directly from the application interface

List of TODO Tasks

1. Expand Database for Additional Inputs:
    - Research and plan the necessary database schema changes to support additional inputs
    - Implement database modification to accommodate teachers to submit data whenever necessary
    - Test database changes and submission process across different user scenarios to identify and address any issues
2. Incorporate Media File Submission:
    - Research and select appropriate storage solutions for handling images and videos
    - Design and implement a feature for teachers to upload media files along with their data form submissions
    - Develop backend functionality to securely store and organize media files in the chosen storage solution
    - Test media file submission functionality across different devices and file formats to ensure reliability.
3. Organize Media Files by Project Category:
    - Define a categorization system for organizing media files by project type or category
    - Implement features to tag or label media files with relevant project categories during submission.
    - Develop functionality for administrators to filter and access media files based on project categories
    - Test the organization and retrieval of media files to ensure accuracy and efficiency.
4. Expand Dashboard with Additional Filters:
    - Plan and design the new filters to be added to the dashboard for viewing statistics

    - Develop backend functionality to retrieve and filter data based on selected criteria such as teachers, schools, grade levels, clusters, and overall data
    - Integrate the new filters seamlessly into the existing dashboard interface, ensuring a cohesive user experience
    - Test the functionality of the new filters across different user scenarios to ensure accuracy and performance
5. Integration with Angular Web Application:
    - Link the database to the web applications developed in Angular, ensuring seamless data retrieval and synchronization between the database and the user interface
6. Connection of Dashboard to Angular Web Application:
    - Connect the dashboard to the web application developed in Angular to provide users with access to statistical analyses and insights directly from the application interface