Green Stormwater Infrastructure in SE Michigan

Heuristic Evaluation

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Design Description

The Green Stormwater Infrastructure(GSI) App is a web app that allows High School students to get more educated on the prevalence of GSI locations in the Southeast Michigan area by contributing to the information collection effort for recording these infrastructures. At the same time, the information added to the app will also be used to educate the general public about the importance of GSI and how it helps to mitigate flooding.

The students will have their own accounts provided by their teachers and the teachers' accounts will be created by the Client scientist. This will entail the creation of different views of the app according to the User's privilege level, with the general public having least privileged view and the Client scientist having the highest privileged view.

Identification of UI Domain

Based on the functionality provided to the various Users, this app can be classified as "Educational Mapping Web App for Environmental Awareness"

Heuristics Usability Principles

1. **Clarity in Educational Content Presentation:**

   - Ensure all educational materials (text/images/videos) are presented in a clear, engaging manner. Use language and visuals appropriate for the app's diverse audience, including high school students, teachers, and the general public.

2. **Intuitive Navigation and Interaction with Mapping Features:**

   - The map interface should be intuitive, allowing users to easily zoom, pan, and select GSI locations. Interactive elements like markers and information pop-ups must be accessible and provide meaningful data at a glance.

3. **Consistency in Design and Functionality:**

   - Maintain a consistent design language (colors, typography, button styles) and functionality across the app to reduce the learning curve and enhance user comfort.

   - This principle is important because there will be multiple views of this app depending on the user's role and this can cause consistency issues.

4. **Error Prevention and Recovery in Submissions:**

   - Offer clear guidance for submitting GSI locations, including input validation and error messages that help users correct mistakes. Ensure the submission process is forgiving, allowing users to edit or cancel submissions before finalizing.

5. **Feedback and Interaction Responsiveness:**

   - Provide immediate feedback for user actions, such as successful submissions or updates to the map. Ensure the app responds quickly to user inputs to maintain engagement and reduce frustration.

6. **Accessibility for All Users:**

   - Design the app to be accessible to users of all ages and abilities, incorporating features like large touch targets for older users, and simple, clear language for younger users.

7. **Support for Collaborative and Social Interaction:**

   - Facilitate a sense of community and collaboration by allowing users to view contributions from others and contact the Scientist in case any corrections need to be made to the already submitted locations.

8. **Efficient Use of Real Estate and Minimalist Design:**

   - Optimize the layout for mobile devices, focusing on minimalism and the efficient use of screen real estate to display the most important information without overwhelming the user.

9. **Security and Privacy in User Data Handling:**

   - Ensure user data, especially login credentials and personal information, is handled securely. Since the app will be handling data of schoolchildren, utmost care should be taken to ensure its protection from the general public.

Potential Usability Problems

1. **Educational Content Presentation:**

   - **Location:** Home Page

   - **Usability Problem:** Overly technical language in educational materials may confuse younger users or those unfamiliar with Green Stormwater Infrastructure (GSI).

   - **Violated Heuristic:** Clarity in Educational Content Presentation

2. **Consistency Across the App:**

   - **Location:** Various Pages (Home, Map, Submission)

   - **Usability Problem:** Inconsistent button styles and navigation menus across different sections of the app may lead to confusion and reduce the app's perceived professionalism.

   - **Violated Heuristic:** Consistency in Design and Functionality

3. **Submission Error Handling:**

   - **Location:** Submission Page

   - **Usability Problem:** Lack of clear error messages when users enter invalid data (e.g., incorrect GPS coordinates) could lead to frustration and failed submissions.

   - **Violated Heuristic:** Error Prevention and Recovery in Submissions

4. **Feedback on User Actions:**

   - **Location:** Submission and Map Pages

   - **Usability Problem:** Delayed feedback after submitting a new GSI location or lack of indication when a map is updating could leave users uncertain if their actions were successful.

   - **Violated Heuristic:** Feedback and Interaction Responsiveness

5. **Accessibility Features:**

   - **Location:** Entire App

   - **Usability Problem:** Small touch targets and use of color alone to convey information may be inaccessible for older users with vision difficulties or color blindness.

   - **Violated Heuristic:** Accessibility for All Users

6. **Information Density:**

   - **Location:** Web App on Mobile Devices

   - **Usability Problem:** Overcrowded information and small text on the map page can overwhelm users, especially on smaller screens.

   - **Violated Heuristic:** Efficient Use of Real Estate and Minimalist Design

7. **Privacy and Data Security:**

   - **Location:** Account Creation, Login Pages, Map View

   - **Usability Problem:** Unclear privacy policy or lack of visible security measures (e.g., HTTPS indication) might make users hesitant to create accounts or trust the app with their data. Also, improper handling of the schoolchildren's information can cause public exposure of data.

   - **Violated Heuristic:** Security and Privacy in User Data Handling

Critical Usability Concerns

1. **Ineffective Educational Content Delivery:**

   If the educational content is not clear and engaging, users, especially high school students, might not learn effectively about GSI, undermining the app's primary educational goal.

2. **Interactive Map Navigation Difficulty:**

   Users unable to navigate the interactive map easily may disengage from exploring newer GSI locations, which is a key goal of the app.

3. **Submission Process Barriers:**

   Frustration from failed attempts to submit new GSI locations due to unclear error prevention and recovery could discourage user contributions, reducing the app's hands-on educational value.

4. **Accessibility Limitations:**

   If the app is not accessible to users with devices of varying sizes, it may exclude significant user segments from participating fully, thereby not meeting its goal of widespread public education and engagement.

5. **Delayed or No Feedback on User Actions:**

   Lack of immediate feedback on crucial actions like submissions could lead to confusion about whether the action was successful, potentially causing users to repeat submissions or abandon the task.

Critical Usability Scenarios

Scenario 1:

- Emma, a high school student, is excited to learn about Green Stormwater Infrastructure (GSI) for a school project. She navigates to the app, eager to dive into the educational materials provided.
- Once on the app, Emma finds the information on GSI filled with technical jargon and complex explanations that are difficult to understand. The lack of interactive or visual aids (e.g., engaging infographics) makes it hard for her to grasp the importance and functionality of GSI.

Scenario 2:

- Mr. Thompson, a high school teacher, plans to use the app to show his students the locations of GSI projects in Southeast Michigan during a class outing.
- Upon accessing the map feature, Mr. Thompson struggles with zooming in and out on his tablet. The map's interface is not responsive enough and the markers representing GSI locations are too small, making it hard for him and his students to access their information. The difficulty in navigating the map frustrates both him and his students, detracting from the learning experience.

Scenario 3:

- Sarah, an environmentally conscious teenager, discovers a new GSI project in her neighborhood. Excited, she decides to contribute this information to the app to share with her community. Sarah attempts to submit the GSI location but encounters an error message stating her submission is invalid.
- The message is vague, and the app does not offer guidance on how to correct her submission. After several failed attempts and growing frustration, Sarah decides not to contribute anymore, feeling that her effort to engage with the app is wasted.