

Challenge 3 Report

Vibe coding: Play to Impact

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Introduction

Saigon Sort is a 2D web-based educational game developed to address the growing challenge of plastic waste and urban flooding in Ho Chi Minh City, Vietnam. The game is designed as an interactive drag-and-drop experience that encourages players to correctly sort waste into appropriate bins. By connecting the act of waste separation to its impact on the environment, the game aims to raise public awareness and promote sustainable behavior in a fun, accessible way. The concept follows the spirit of the Vibe Coding Challenge, which calls for games that highlight pressing social challenges through simple yet meaningful mechanics.

At its core, *Saigon Sort* conveys a powerful message: “Sorting your trash isn’t just good manners — it keeps your city from drowning.” This reflects the real-world consequences of improper waste management in Vietnam’s urban areas, where litter and plastic waste often block drainage systems, leading to severe flooding during monsoon seasons.





Game Theme and Topic Justification

The chosen theme for *Saigon Sort* is environmental sustainability, specifically focusing on urban waste mismanagement and its connection to flooding in Vietnam. In recent years, Ho Chi Minh City has faced increasingly frequent floods, largely caused by clogged drainage systems filled with non-biodegradable waste such as plastic bags, bottles, and packaging. Vietnam generates approximately 3.6 million tonnes of plastic waste each year, and a large proportion of this ends up in landfills or waterways.

This issue directly affects the city’s infrastructure, public health, and overall quality of life. Therefore, *Saigon Sort* seeks to educate players about proper waste

sorting and the long-term environmental benefits of sustainable habits. The game localizes its design by featuring familiar items such as plastic bottles, coffee cups, and plastic bags, creating an authentic and relatable experience. Through gameplay, players understand that simple, daily actions — like disposing of waste correctly — can collectively prevent urban flooding and improve community resilience.

Game Mechanics

The game *Saigon Sort* employs an interactive drag-and-drop mechanism that simulates the process of household waste separation. Players are presented with a continuous stream of waste items, each categorized into one of four types: Recycle, Organic (Compost), E-waste, and Landfill. Each item is represented by an emoji and a label (e.g.,  *plastic bottle*,  *food scrap*,  *battery*,  *plastic bag*), enabling clear visual recognition and intuitive interaction.

The primary objective is to correctly sort each item into its corresponding bin before the item's individual timer expires. Correct sorting actions increase the player's Score and Community Trust, which symbolize responsible behavior and positive social impact. Conversely, incorrect sorting or delayed actions increase the Pollution level, representing the environmental cost of improper waste management.

The Pollution system introduces escalating consequences that mirror real-world urban environmental issues. When Pollution reaches 50%, drainage systems are considered “clogged,” reducing the time available for subsequent items. At 100%, the game ends with a simulated “flooding” scenario, highlighting the link between waste mismanagement and flooding events common in urban Vietnam.

Gameplay is structured into sequential in-game Days. Each day provides a limited Timer within which the player must process as many waste items as possible. Upon completing a day, the player receives a summary of performance metrics and may select an upgrade (e.g., improved sorting efficiency or community initiatives) to enhance performance in subsequent rounds. These upgrades represent incremental progress toward a cleaner and more sustainable community.

The game also includes Daily Seed and Custom Seed modes, allowing repeatable item sequences for consistent practice, fair comparison, and competitive play. This feature encourages replayability and supports the development of player accuracy over time.

The underlying system tracks several core statistics throughout gameplay:

- **Score:** Accumulated through correct sorting; deductions apply for errors.
- **Community Trust:** Reflects long-term improvement through consistent correct behavior.
- **Pollution:** Increases following incorrect actions; excessive accumulation results in game termination.
- **Timer:** Defines the duration of each gameplay day; certain items also feature individual expiration timers.
- **Day Counter:** Records player progression across multiple sessions.

Collectively, these mechanics form a cohesive educational experience that combines entertainment with environmental awareness. *Saigon Sort* encourages players to recognize the broader implications of everyday waste habits, reinforcing civic responsibility and sustainability through engaging, game-based learning.

Technical Implementation

The game was developed using a lightweight and fully front-end technology stack consisting of **HTML5**, **CSS3**, and **JavaScript**. These core web technologies ensure the game can run directly in any browser without installation or server setup.

Component	Technology Used	Description
Frontend Framework	HTML5, CSS3, JavaScript, Reactjs + Vite	Core structure, style, and interactivity, emoji-based for fast loading times
Data Persistence	localStorage	Saves upgrades, scores, and day progression
Asset Format	SVG/PNG	Lightweight graphics for trash items, bins, and UI icons

AI Integration and Development Process

The development of *Saigon Sort* adopted the “vibe coding” methodology, using large language models (LLMs): Codex, and creative AI tools throughout every stage of design and production. The main tool used was Gemini Pro, which assisted in several key phases:

- **Concept Ideation:** Brainstorming the social issue (plastic waste in Vietnam) and generating creative gameplay ideas through guided prompts.

- **Visual Concept Generation:** AI-generated descriptions for 2D backgrounds, trash icons, and Saigon-inspired street visuals.
- **Code Generation:** LLM-assisted creation of HTML, CSS, and JavaScript logic for drag-and-drop functionality, scoring, and pollution systems.
- **Refinement & Debugging:** Prompt-based debugging and UX improvement iterations using conversational AI refinement cycles.

This workflow demonstrates how LLMs can act as collaborative creative partners, enabling faster prototyping and design exploration while maintaining human oversight and contextual relevance.

Impact and Relevance

The educational impact of *Saigon Sort* lies in its ability to visualize the relationship between individual waste disposal habits and collective urban challenges. By translating environmental concepts into interactive gameplay, the game encourages players to internalize lessons about sustainability and pollution prevention. Schools and local NGOs can integrate the game into environmental awareness campaigns or classroom activities, turning learning into an engaging, interactive experience.

Beyond individual learning, *Saigon Sort* promotes community engagement. The pollution bar and flooding event serve as symbolic representations of real-world consequences, demonstrating how negligence at the individual level can lead to large-scale social and environmental problems. The simplicity of the gameplay ensures accessibility for all ages, making it suitable for public outreach and educational exhibitions.

Thematically, the game aligns with the United Nations’ Sustainable Development Goals (SDG 11 — Sustainable Cities and Communities) and SDG 13 — Climate Action, addressing environmental stewardship through creative technology and gamified learning.

Reflection and Future Work

Developing *Saigon Sort* highlighted the effectiveness of AI-assisted “vibe coding” as a new creative process. Large language models accelerated idea generation, and code iteration, allowing the project to move from concept to prototype efficiently. The most successful aspect of the project was the seamless integration of education and entertainment. The drag-and-drop mechanic proved intuitive and rewarding, making learning about waste management enjoyable.

However, several challenges arose during development. Balancing educational content with engaging gameplay requires careful consideration. It was also challenging to maintain simplicity while adding meaningful environmental feedback. Technical limitations, such as ensuring responsive design across devices, demanded extra testing.

Overall, the project demonstrated that artificial intelligence can act as a true creative collaborator, assisting in both technical and conceptual development. The process emphasized that educational games need not be complex to be impactful — relevance, accessibility, and local context are the most powerful tools for awareness-building.

Several improvements are planned for future iterations of *Saigon Sort*. These include introducing multiple player functions, encouraging competitions between friends and widespread. The project also aims to expand into a mobile-friendly

Progressive Web App (PWA) format and include a leaderboard system for schools or community challenges. These enhancements will increase replay value, educational reach, and engagement while keeping the game grounded in real social impact.

Conclusion

Saigon Sort successfully addresses a critical environmental issue in Vietnam through creative gameplay and AI-powered design. It transforms the act of waste sorting into an educational experience that connects personal responsibility to collective outcomes. The project demonstrates how AI-assisted development can enable small teams or individuals to create meaningful, socially relevant digital experiences that inspire change.

The final prototype stands as a functional, browser-based game ready for demonstration and public engagement. It offers not only entertainment but also insight — reminding players that even simple actions, like sorting waste, can protect their city and the environment for generations to come.