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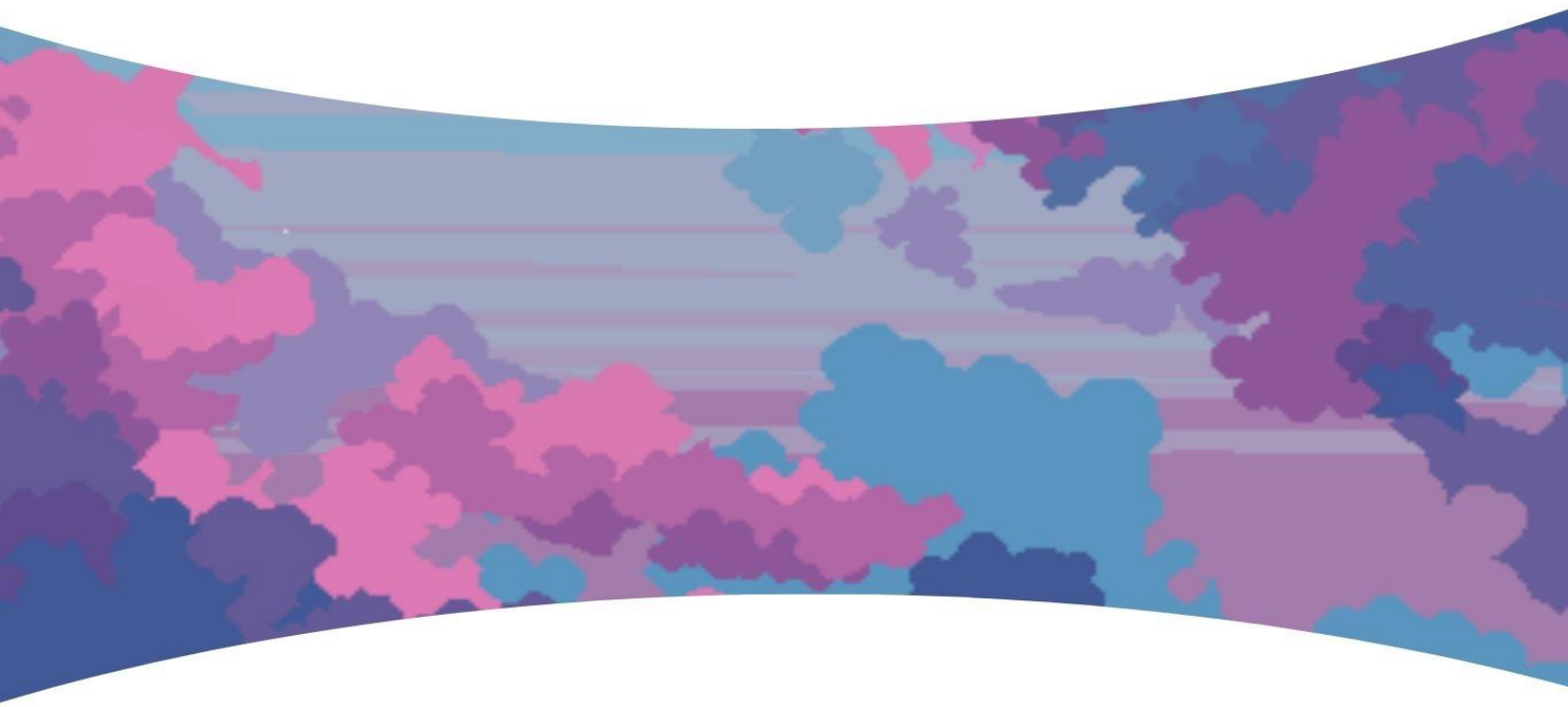

ECO QUEST ADVENTURE

REPORT

For the RMIT 2025 Hackathon

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1. Introduction

EcoQuest Adventure is a 2D pixel platformer that blends classic retro gameplay with modern educational design. Inspired by Codedex, we built this game to raise awareness about environmental and social issues in Australia and Vietnam, the game challenges players to explore pixelated worlds, avoid hazards, collect eco-tokens, and answer trivia questions that test their understanding of climate, community, and sustainability topics.

The goal is to make learning feel natural and enjoyable instead of reading information passively, players learn through interaction. When players collide with a quiz box or reach a checkpoint, a trivia question appears, transforming gameplay into a moment of reflection and decision-making.

By combining pixel art visuals, smooth platforming physics, and meaningful trivia, EcoQuest Adventure creates an educational experience that feels both nostalgic and purpose driven.

2. Game Theme Topic Justification

The game addresses critical environmental and social challenges faced by both Australia and Vietnam:

- Climate change impacts on communities

- Social inequality and access to services

- Environmental conservation

- Urban development challenges

- Cultural preservation and adaptation

By presenting these issues through an engaging game format, we make complex topics more accessible and memorable for players.

3. Potential Impact

a. Educational Impact

- Encourages **active learning** through direct interaction — players must think critically before answering.
- Makes **complex environmental concepts** more approachable by embedding them into gameplay.

- Enhances **memory retention** through visual and kinetic reinforcement.
- Supports **STEM and social awareness** learning objectives relevant to school curriculums.

c. Social Impact

- Promotes **cross-cultural understanding** by showing shared issues between Vietnam and Australia.
- Inspires **empathy** through story moments, such as helping communities rebuild after in-game environmental damage.
- Fosters a sense of **global citizenship** — understanding sustainability as a universal effort.
- Provides an **accessible medium** for youth engagement and classroom discussion.

d. Environmental Impact

- Reinforces eco-conscious behavior — collecting tokens, restoring nature, and answering environmental trivia are rewarded.
- Raises awareness of **local and global ecosystems** using familiar pixel landscapes.
- Encourages real-world reflection — every in-game decision symbolizes a sustainable or harmful real-life action.
- Connects fun gameplay loops with long-term **sustainability thinking**.

4. Technology Stack

a. Frontend & Rendering

- HTML5 Canvas – Renders all pixel art sprites, backgrounds, and animations at high performance.

- Vanilla JavaScript (ES6+) – Handles player movement, physics simulation, collisions, and quiz logic.

- CSS3 – Manages the game's layout, menus, and retro-style visual themes.

d. Engine Features:

- Custom physics system

- Collision detection

- Level management

- Animation system

- State management

e. AI Tools Used:

- GitHub Copilot for code generation and refinement

- AI-assisted level design and balancing

- Prompt engineering for game mechanics. All prompts have been recorded in the prompts folder, as instructed.

f. Web Libraries:

- No external libraries used - pure vanilla implementation

- CSS animations for visual effects

5. Game Mechanics Overview

a. Core Gameplay:

- Classic platformer movement (run, jump)

- Multiple jumps capability

- Hazard avoidance

- Question block interaction

- Checkpoint system

b. Educational Elements:

- Interactive quiz blocks

- Environmental fact integration

- Progressive difficulty increase

- Score-based learning incentives

c. Scoring System:

- +100 points for correct answers

- +20 points for reaching checkpoints

- -20 points for hazard hits

- Our game also has a “best score” tracking system.

d. Health System:

- Three hearts health system that persists between levels

- Full reset on complete death, which encourages strategic health management

6. Reflection

a. Technical Achievements

- Created a fully functional pixel-platformer engine from scratch using only JavaScript and Canvas.
- Implemented real-time collision-based trivia triggers, integrating learning seamlessly into gameplay.
- Developed smooth input handling and physics calculations for a natural feel.
- Used data persistence to track long-term progress without backend dependencies.
- Optimized sprite rendering for 60 FPS gameplay even in large tile maps.

b. Learning Outcomes

- Canvas rendering, sprite animation, and collision systems.
- Learned to integrate educational logic (questions, answers, and scoring) within gameplay loops.
- Improved ability to design balanced levels that are fun yet meaningful.
- Gained insight into player motivation — how rewards and feedback enhance engagement.
- Strengthened collaboration and AI-assisted development workflow.

c. Challenges Overcome

- Collision Precision: Ensuring trivia boxes only trigger once per collision.
- Responsiveness: Adjusting resolution and scaling for both desktop and mobile.
- Data Management: Preventing score duplication and maintaining quiz state persistence.

- Visual Cohesion: Designing pixel assets consistent with the game's educational tone.
- Balancing Learning and Fun: Ensuring trivia segments enrich, not interrupt, gameplay flow.

d. Future Improvements

- Add more levels representing new global ecosystems (e.g., coral reefs, deserts).
- Introduce sound design: ambient nature sounds, retro music, and correct-answer jingles.
- Expand trivia with image-based and scenario-based questions.
- Add NPC dialogue and storytelling for deeper immersion.
- Experiment with local multiplayer for cooperative eco missions.
- Integrate online leaderboards and weekly challenges to boost replay ability.

7. Conclusion

EcoQuest Adventure proves that education and entertainment can coexist naturally within game design. By merging the nostalgia of 2D pixel platformers with interactive trivia mechanics, the project creates an accessible, engaging way to learn about real-world environmental and social issues. Through collision-triggered learning events, responsive gameplay, and visually appealing pixel art, EcoQuest Adventure invites players to play, learn, and act — transforming awareness into understanding and understanding into change. Ultimately, the project reflects the potential of game-based learning as a powerful medium for raising awareness and inspiring environmental responsibility in younger generations.