

Game Based Evaluation Model

Ecoquest: Earth Explorer

"EcoQuest: Earth Explorer" is an immersive educational game designed to teach Earth science through interactive exploration and problem-solving. Players navigate diverse environments such as deserts, forests, oceans, mountains, and glaciers, where they encounter real-world science challenges like erosion, weather events, and ecosystem restoration. Students complete quests, solve puzzles, and collect items while applying Earth science vocabulary and concepts.

Overview



- In this game-based learning activity, students will explore and manage various Earth science environments in EcoQuest: Earth Explorer. By applying real-world science concepts such as ecosystem restoration, resource management, and environmental problem-solving, students will gain a deeper understanding of how natural systems function and the challenges they face. Through immersive gameplay, students will navigate diverse ecosystems, make critical decisions, and collaborate with peers to solve environmental issues like erosion, pollution, and weather-related events. This hands-on approach will help them connect scientific knowledge to real-world applications.

What is the Game Based Model?

The Game-Based Evaluation Model is a structured framework designed to assess learning outcomes and student engagement through the integration of educational games. This model merges core educational principles with game design elements to create assessments that are both interactive and measurable, reflecting learners' progress and understanding in an engaging format. The key components of the model include:

The Input component of the Game-Based Evaluation Model (GEM) encompasses the resources, materials, and contextual elements essential for facilitating a game-based learning experience. This includes the game's design, instructional materials, and the learners' existing knowledge and skills.

The Process component of the Game-Based Evaluation Model (GEM) emphasizes the interactions and activities that take place during the game-based learning experience. This includes learners' engagement, problem-solving, decision-making, and collaboration within the game environment.

The Output component of the Game-Based Evaluation Model (GEM) evaluates the outcomes and impact of the game-based learning experience. This includes assessing learners' knowledge acquisition, skill development, and attitude changes, as well as determining the overall effectiveness of the game in achieving the desired learning objectives.

Input



- The target demographic for EcoQuest: Earth Explorer includes elementary school 6th grade students, typically aged 11-12. These learners come from diverse backgrounds and learning environments, including public and private schools. The demographic includes students at various stages of cognitive development, with a strong focus on visual learning, active engagement, and foundational skills in science. Many of these students are beginning to explore Earth science topics, making them ideal candidates for a game-based learning experience that fosters curiosity, collaboration, and critical thinking.

- Cognitive Capacity: Students need to handle slightly more complex tasks like navigating different environments and solving Earth science-related problems.

- Students aged 11-12 are characterized by a strong sense of curiosity, eagerly exploring and learning new things. They are developing independence and seek more control and choices in their learning experiences. Social awareness grows, making them more sensitive to peer interactions and group dynamics. Their critical thinking skills are emerging, allowing them to analyze information and consider different perspectives. They prefer interactive and engaging activities and may become easily distracted if the content isn't captivating. Additionally, they are more self-reflective, becoming increasingly aware of their own strengths and areas for improvement.

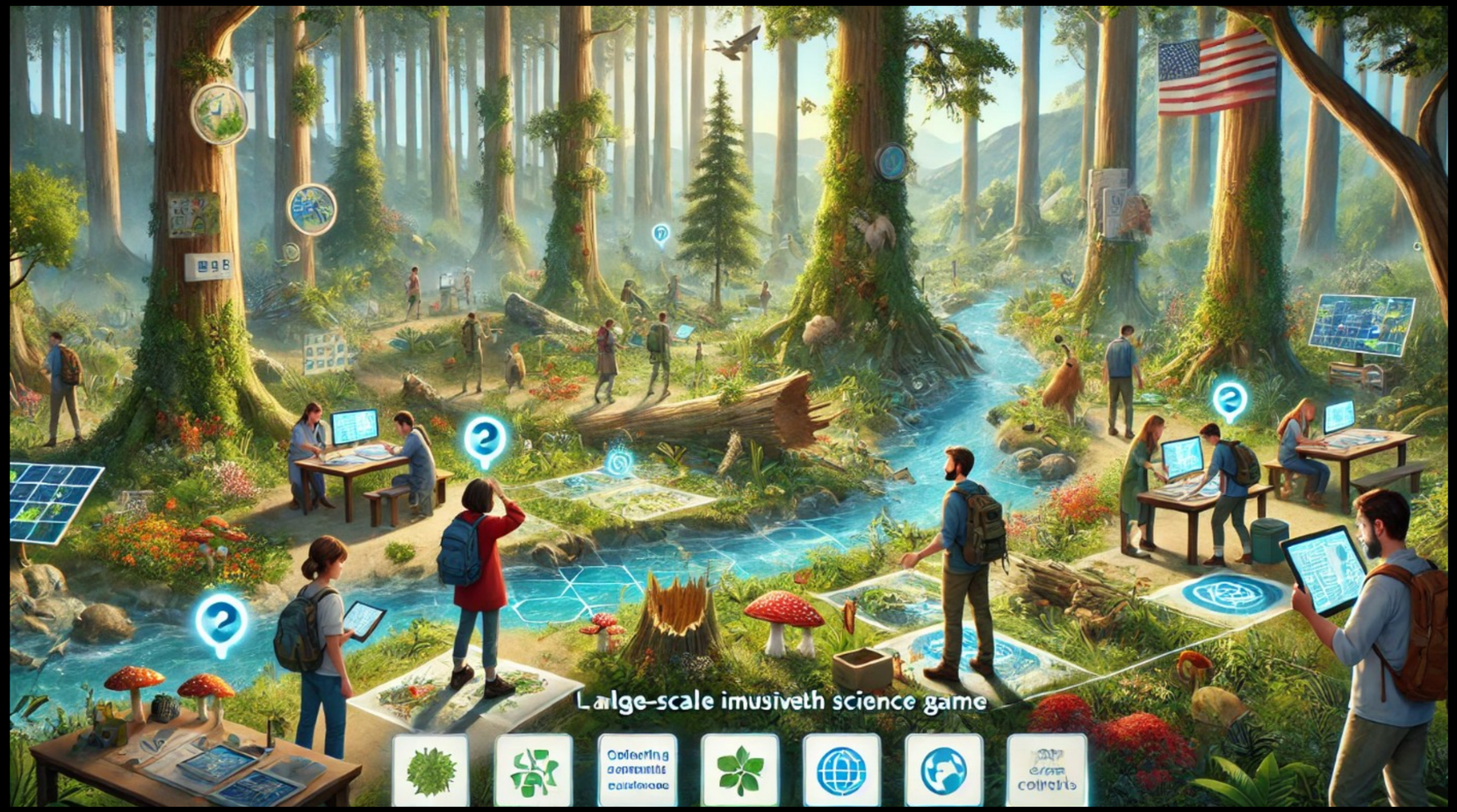
By understanding the diverse needs and characteristics of the target learners, the EcoQuest: Earth Explorer activity can be tailored to effectively engage and educate elementary and middle school students in Earth science, ecosystems, and environmental conservation.

Learning Environment (Process)

- Game World
  - The expansive game world would represent different environments such as ecosystems, climate zones, or geological formations, each with several interactive elements.
- Action Language
  - Students would engage in a more complex interaction system, such as walking through ecosystems, collecting objects (like minerals or plant samples), or solving environment-specific challenges (like helping animals survive in specific conditions).
- Rules and goals
  - The game would have clear objectives such as "restore the forest ecosystem by completing these three challenges" or "survive the desert by solving vocabulary puzzles."
- Social Interaction
  - Players might work together on collaborative challenges, for example, working as a team to "restore" an ecosystem by identifying key vocabulary and solving problems related to that environment.
- Challenges
  - Challenges will progressively increase in difficulty, including:
  - Navigating natural hazards (e.g., avoiding erosion, predicting volcanic activity).
  - Matching vocabulary terms to environmental objects or phenomena.
  - Completing quests related to Earth science concepts.
- Control and feedback:
  - Real-time feedback is essential for guiding students in exploring new environments or solving puzzles. Rewards like points, badges, or levels are given for correct answers, aiding their progress in the game.



Environmental Influence (Process)



- Organizational Environment
  - Support from teachers, integration of the game into the science curriculum, and the availability of enough devices and resources would be needed to allow students to fully engage in the game.

- Personal Circumstances
  - Whether students can access the game both in and out of the classroom. Since it's a larger-scale game, access to technology and time for exploration are very important.

Learning Indicators (Process)





- Emotional-Motivational
  - Self-efficacy: As students succeed in navigating the immersive environments and solving science-related problems, self confidencr in learning Earth science terms grows.
  - Motivation and Engagement: The open-world exploration and quest design would keep students motivated and engaged. They might also be driven by receiving rewards like points or badges as they progress through different Earth science zones.
- Cognitive
  - Self-directedness: In the big game environment, students would need to decide how to explore the game world, choosing which environments to explore or which quests to complete first, fostering independent learning.
  - Learning Activity: Active engagement is key, as students would not just passively learn vocabulary but also interact with the environment, making decisions and solving problems that require them to apply the terms they’re learning.
  - Mental Effort: The complexity of the game would challenge students to think critically about how the terms relate to real-world science, applying their vocabulary knowledge to various in-game scenarios.

Learning Outcomes and Transfer of Learning (Output)



- Attitude
  - The immersive game environment will foster a more positive attitude toward science, encouraging curiosity and exploration of real-world science concepts.
- Competencies
  - Students will demonstrate the ability to connect Earth science vocabulary with real-world phenomena, like understanding how erosion affects landscapes or how ecosystems function.
- Knowledge
  - Students will gain an in-depth understanding of Earth science vocabulary by applying it to real-world contexts and solving in-game problems.
- Skills
  - Students will develop critical thinking and problem-solving skills as they navigate the game world and solve Earth science challenges.
- Performances
  - By the end of the game, students will be able to accurately apply Earth science vocabulary in classroom discussions, tests, and real-world observations, showing measurable improvement in their comprehension and performance.

Competencies and Performance



Performance Assessment

- The success of the students' exploration in EcoQuest: Earth Explorer will be measured using in-game metrics such as ecosystem health, successful problem-solving, and resource management. Students will also participate in post-game reflections and discussions, analyzing their successes and challenges in restoring environments and solving Earth science problems. They will discuss what they learned and how it applies to real-world environmental science and conservation.

Transfer of Knowledge

- The success of the students' quests in **EcoQuest: Earth Explorer** will be measured using in-game metrics such as ecosystem restoration, resource management, and environmental problem-solving. Students will also participate in post-game reflections and discussions, where they will analyze their accomplishments and challenges in addressing Earth science issues. They will reflect on what they learned and how it applies to real-world environmental science and conservation efforts.

EcoQuest: Earth Explorer



- The EcoQuest: Earth Explorer activity fully integrates the GEM model by aligning student input (learner traits), the process (in-game experiences), and output (measurable learning outcomes). Through immersive, interactive gameplay, students will develop critical Earth science knowledge and environmental problem-solving skills in a meaningful and engaging way.



learning Indicators

Game Based Evaluation Model

Input

- Personality: Curious and playful elementary students.
- Cognitive Capacity: Students need to handle slightly more complex tasks like navigating different environments and solving Earth science-related problems.
- Education and Experience: Exposure to science concepts may vary, but the game will scaffold learning to accommodate different levels of familiarity with Earth science.
- Biographical and Demographical Features: 6th grade elementary students ages 11-12.

Output

- By playing the game, students will deepen their
- understanding of Earth science vocabulary,
- develop critical thinking skills, foster curiosity,
- and demonstrate improved performance by
- accurately applying concepts in both classroom
- discussions and real-world contexts.



Process

- Goal/Objective: Enhancing student understanding of Earth science concepts, such as ecosystems, weather patterns, and environmental problem-solving.
- Students will engage in an immersive quest-based game using a storyline to guide them through various Earth science environments. Learners will have the option to choose their adventure.
- Option 1: You've been accused of damaging a fragile ecosystem, and you must solve environmental clues to identify the real culprit and restore balance to the ecosystem, while also clearing your name.
- Option 2: A rare natural habitat is on the verge of destruction. You must solve science-based puzzles to preserve the environment and save the species that live within it.
- The overall intent of the game is for students to answer Earth science-related questions that unlock clues and solutions to help them solve the mystery and "restore" the environment.



Learning Indicators

- As students successfully navigate the game and solve problems, their confidence in learning Earth science terms increases, while the open-world exploration and rewards system keep them motivated and engaged. The game fosters independent learning by encouraging self-directed exploration and challenges students to actively apply vocabulary in complex, real-world science scenarios.

Learning Outcomes and TQL

By playing the game, students will deepen their understanding of Earth science vocabulary, develop critical thinking skills, foster curiosity, and demonstrate improved performance by accurately applying concepts in both classroom discussions and real-world contexts.





EcoQuest: Earth Explorer

Game - Based Model Evaluation

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References

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