

Serious Games Project



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GENERAL VISION

Technical sheet

- **Name:** ReDefense
- **Genre:** Tower defense, Musou.
- **Number of players:** Single player with scoreboards.
- **Language:** English, Catalan, Spanish.
- **Platform:** PC.

Synopsis

Set in a world plagued by pollution, the game follows a courageous protector on a mission to safeguard a precious artifact from relentless garbage monsters. As the hero battles waves of enemies, they must sort and recycle each type of garbage into the correct containers to restore balance to nature. Guided by the wise and empathetic Mother Nature, players will defend the artifact, recycle responsibly, and witness the rejuvenation of the environment as their efforts succeed.

Objectives

- **Understand the correct classification of waste:** Players will learn to identify different types of waste (organic, paper/cardboard, glass, plastic and special waste) and to dispose of them correctly in their respective bins.
- **Recognize the environmental impact of proper recycling:** Players will see how recycling directly influences the recovery of the natural environment.
- **Encourage to recycle:** The game will seek to motivate players to adopt sustainable habits in an active and conscious way.
- **Apply recycling knowledge in practical contexts:** Players will acquire skills that are transferable to the real world, such as sorting waste at home, at school or in the community.

Target audience

Our target audience will be children between **6 and 13 years old**, that likes video games and with a very low knowledge about recycling.

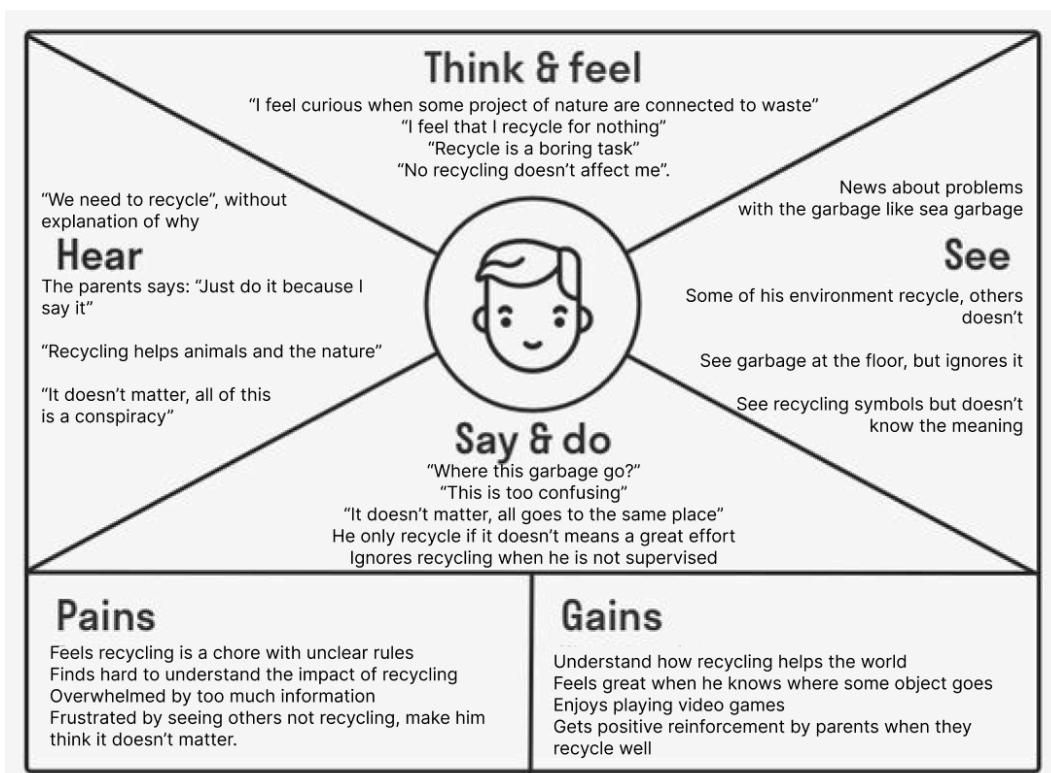
This audience thinks and feels that recycling is a boring task that their parents tell them to do. Also, they think that recycling doesn't affect them and if they recycle, they feel like it's for nothing. Furthermore, they feel curious when a game or project of nature is related to waste.

In their surroundings, they see that some people recycle, and encourage them to do it too. Besides that, there are other people that don't recycle. Also, they see some signs related to recycling, but don't know their meaning.

Most of the time they listen that they need to recycle, but not the reason for it, and if they don't do it they get reprimanded by their parents. Sometimes they listen that recycling doesn't matter, that all of this is a conspiracy of the world governments.

Normally when you ask them their opinion about recycling they don't know what to answer besides that it is a boring chore, because of their lack of information. And they only recycle if someone is supervising them.

With all this information, the empathy map of the target audience will be like this:



Stakeholders map

Our stakeholders map is divided into 3 sections.

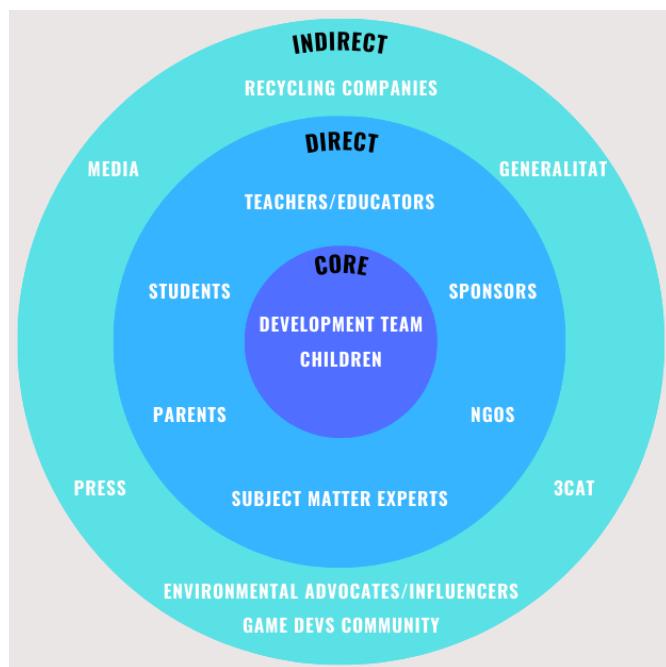
1. Core Stakeholders

Those directly responsible for the design, development, and success of the game.

- **Development team:** The entire video game design, art and development team.
- **Children:** The players are the main target of the video game.

2. Direct Stakeholders

Those who interact directly with the game or have a significant impact on its educational purpose.



3. Indirect Stakeholders

Those impacted secondarily or interested in the project due to its outcomes.

- **Local Governments/Municipalities (Generalitat):** Promote environmental education and may support related school initiatives.
- **Media/Press/3CAT:** Spread awareness of the game's impact on education and sustainability.
- **Recycling Companies:** Promote recycling and may use the game as part of their campaigns.
- **Environmental Advocates/Influencers:** Could amplify the game's reach by promoting it on social media.
- **Game developers community:** The developer community can publicize the game and provide feedback.

Market study

Many projects related to recycling, sustainability and environmental care have already been created.

For example, PepsiCo created a set of recycling-related activities and games for children to learn the value of recycling and caring for the environment.

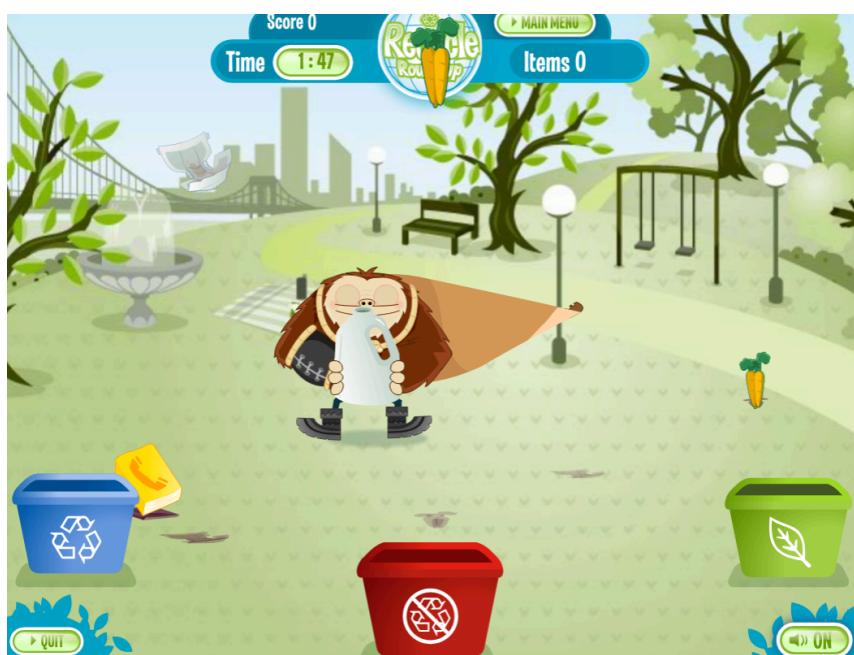
[22 Fun and Free Recycling Games for Schools | PepsiCo Recycle Rally](#)



Other companies or learning platforms choose to develop small mini games playable in browsers, updating to new technologies, thus facilitating learning about recycling from anywhere with simple interactive experiences. These games are usually mini games where the player drag the corresponding object to its container.

Some examples of mini games:

- [Clean and green | LearnEnglish Kids](#)
- [Recycle Roundup | National Geographic](#)
- [Litter Critters | ABCya!](#)
- [Recycling Waste | TurtleDiary](#)
- [Recycling Sorting Game | Eco-Cycle](#)



Recycle Roundup | National Geographic

There are also video game development companies that opt for larger projects, directly creating games that, in addition to entertainment, promote environmental care in various ways. This is basically what we want to get closer to.

There are some video games that promote environmental care such as:

- [Alba: A Wildlife Adventure](#)
 - In this game the player must protect a nature reserve from being destroyed by the construction of a hotel.
- [Eco](#)
 - Build a civilization advanced enough to save the planet from the imminent impact of a meteorite without destroying its fragile ecosystems.
- [Minecraft: Education Edition – Sustainability City](#)
 - This game mode is part of the Minecraft Education Edition and is designed to teach students about alternative energy, sustainable forestry and more.
- [Plasticity](#)
 - It is 2140 and Noa lives in a world where plastic consumption has destroyed the environment. Puzzles must be solved and sustainability principles applied to move forward.

But focusing more on recycling, we can highlight a project that was also developed in Spain with the collaboration of Playstation in 2020. This game is called [The Recycling Heroes](#). This is a cooperative video game with an attractive design, where players control a family of superheroes who must move around different maps while collecting garbage and depositing it in their respective containers. This project, in addition to focusing on learning about recycling and environmental education, also aims to enable the inclusion of people with cognitive disabilities.

This project has many accessibility features:

- PS4 video game and board game.
- Playlink technology to use the phone as a controller and fully personalizable (click, slide, gyroscope).
- Sign language, audio description, subtitles and easy reading.



GAME MECHANICS

The principal mechanics of the game are:

- **Moving:** The player can move around the map.
- **Grabbing garbage:** The player has a grappling that lets him grab the garbage enemies.
- **Recycle garbage:** Once the player has grabbed a garbage, he needs to put it in the correct container (yellow for plastics, blue for paper and carton, brown for organic material, green for glass and a special container for the special garbage). If the player misses, the garbage will continue attacking.
- **Check the garbagepedia:** The player can check the garbagepedia to remember where every type of garbage goes and why.

For the minigames, there will be another mechanics:

- **Cleaning the spaces:** The player has to grab the garbage from the different scenarios affected by garbage (like the sea, a forest...).
- **Obtain power ups for the next stage:** Once the player completes the minigames, he will need to choose a power up for the next level.

To validate the knowledge of the players, at the final level the players will need to fight against the Garbage King, that will make them prove if they learned something, forbidding them to look at the garbagepedia. Also, there will be a scoreboard that depending on the player performance they will be higher or lower.



RULES

The principal objective of the game is to defend the World Tree Seed and deliver it to the spot Mother Nature decided. Also, in order to defend the Seed, the player will need to recycle and clean up the world's garbage.

To win, the player needs to deliver the Seed, but for each zone of the game, the player needs to protect it during a stipulated time in order to advance to the next zone. If the Seed loses all of its health, the player will lose the game.

The player will advance level by level, and he wouldn't be able to choose in what level to start, meaning a linear progression. Between the levels, there will be bonus phases, that the player can choose to complete or not. The objectives of these phases will be cleaning and recollecting garbage, but related with animals and how garbage affects them.

The basic rewards that the games offer are points for completing the level. Also, depending on the performance of the player in that level, he will receive more or less points. This performance will be decided by the garbage he recycles and the recycle streak (when he recycles more than one garbage correctly without making any mistake, he gets more points, increasing for each correct guess).

The bonus phases will give boosts to the player for completing them, that will make him move faster, getting more range...

There will be only two penalties, and they will be related to the enemies. If the player makes a mistake recycling, the garbage wouldn't disappear, and will continue attacking the seed until it gets recycled well. Also, if enemy garbage is not recycled in some time, their speed and damage will increase.

The unique obstacles of this game will be the **Trashees**, a group of garbage headed by the **Trash King**. This Trashees will be divided in different groups, depending on which container they can be recycled:

- **Plastic Trashees:** Group formed by all the garbage that goes to the yellow container.
 - **Speed:** Mid.
 - **Damage:** High.



- **Paper Trashees:** Group formed by all the garbage that goes to the blue container.
 - **Speed:** High.
 - **Damage:** Low.



- **Organic Trashees:** Group formed by all the garbage that goes to the brown container.
 - **Speed:** Low.
 - **Damage:** Low.



- **Glass Trashees:** Group formed by the garbage that goes to the green container.
 - **Speed:** Low.
 - **Damage:** High.



- **Special Trashees:** Group formed by the garbage that has a special treatment.
 - **Speed:** Mid.
 - **Damage:** Mid.



The principal objective of the garbage is destroying the World Tree Seed that the player protects. So their only movement is approaching the Seed. If some time passes without them being recycled, their damage and speed increases, increasing their threat. They will appear randomly somewhere in the map, at a certain distance from the Seed. If the player does not place them in the correct container, they will still attack the Seed.

In order to surpass these obstacles, the player needs to recycle them in the correct container, being the same as in real life (yellow for plastics, blue for paper and carton, brown for organic material, green for glass and a special container for the special garbage).

RESOURCES

World Tree Seed HP: The HP of the World Tree Seed is like the player's life. It gets lower every time it gets hit by the Trashees. There is no way to recover this health when it is lost, and when it goes to 0 the player loses the game.

Power ups: All can be obtained after completing the bonus phases, one for phase.

- ★ **Prepared boots:** Gives the player a pair of boots that make him move easily across the level.

- **Duration:** All the level.



- ★ **Larger grappling:** Upgrades the normal grappling, permitting the player to catch Trashees for a greater distance.

- **Duration:** All the level.

- ★ **Special glasses:** Gives the player a special vision that makes the player see the "aura" of the garbage, that has the same color as the container where they go.

- **Duration:** 5 uses for the level, with 2 second duration for each usage.

Time:

- **Level time:** Each level has a timer that marks how much time the player needs to survive. Once is over, the level is complete.
- **Trashees time:** When this time is over, Trashees increase their strength.

Points: These points are to measure the player performance and are given by different things.

- ❖ **Level complete:** Every time the player completes a level, including bonus phases, it gets points.
- ❖ **Recycle:** Every time the player recycles, get points.
- ❖ **Recycle streak:** For each consecutive correct recycle, the points the player gets each recycle increase.
- ❖ **World Tree Seed:** When the player successfully protects the World Tree Seed, depending on its life, get more or less points.



FICTITIONAL WORLD

This game is located in the Earth of another dimension. On this Earth, the humans have filled the world with so much garbage that it has come to life and now wants to end all the nature of the Earth.

The day the garbage came to life, a Garbage King appeared, and he declared that all life on Earth will disappear very soon.

The Mother Nature, (in this World has taken a Human form) attempted to advise humankind of the upcoming disaster. But no one listened to her, and now she is on her last strengths. With most of the hope lost, she decided to create the player, a spirit of nature, with the mission to plant the World Tree Seed on the Recycle Mountain (where the King garbage is) the only way to save the world now.

Now, the player is embarked on an epic adventure, where it will need to recycle correctly to advance and defend the World Tree Seed.

All the environments are evolution, that means that as the player advances the garbage of the environments will disappear. The principal spaces of the world are:

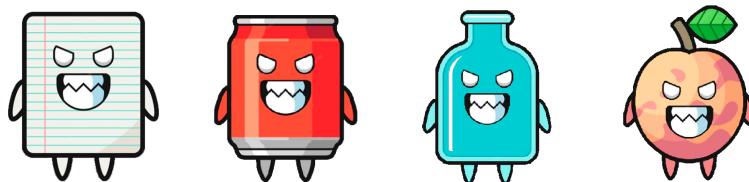
- **Nature's Home:** Where Mother Nature lives and where she is stronger. The adventure starts here, and Mother Nature will help the player to train its skills before joining the adventure.
- **Recycle Mountain path:** Where most of the levels are located. These spaces are fully covered by garbage. As the player advances, more garbage and of different types appear, but the power of Mother Nature will increase.
- **Top of the Recycle Mountain:** Where the journey ends and where the Garbage King waits to stop the player. The most dangerous place, but once the player defeats the Garbage king, this battle will come to an end.

Characters:

- **Garbage King:** The principal antagonist of the game. During the adventure, this King will talk to the player about why the world has become like this and how proud he is about all his success invading the world thanks to the humans.



- **Trashees:** The Garbage King subordinates will do anything to stop the player from advancing.



- **The Mother Nature:** The one that is keeping the world alive. She will be the player mentor and will instruct it on how to recycle. She also will take notes for the player about all the enemies it encounters, and can consult it into the garbagepedia whenever the player wants. At the end of every level, she will tell the player why some garbage goes to one or another container.

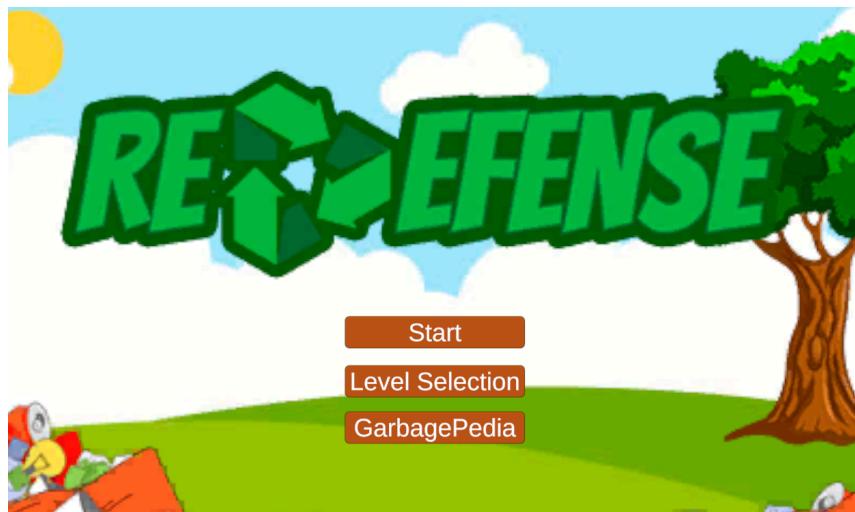


INTERFACE

Title screen

In the Title screen, there are 3 buttons:

- **Start:** Start the story mode.
- **Level selection:** To select the level the player wants to play.
- **Garbagepedia:** To open the garbagepedia.



Dialogues

In the dialogues will appear Mother Nature that will motivate the player and explain information about the next level. On the left, there's the Mother Nature sprite. On the right will appear reference images about Mother Nature is talking about. And in the bottom will be the text box.



Levels

In the center top of the screen there are:

- The amount of time the player must remain in the level to advance.
- The points the player earns by recycling the waste in the corresponding bins.

And in the bottom of the screen there's the World Tree Seed health points bar.



Win/Lose screen

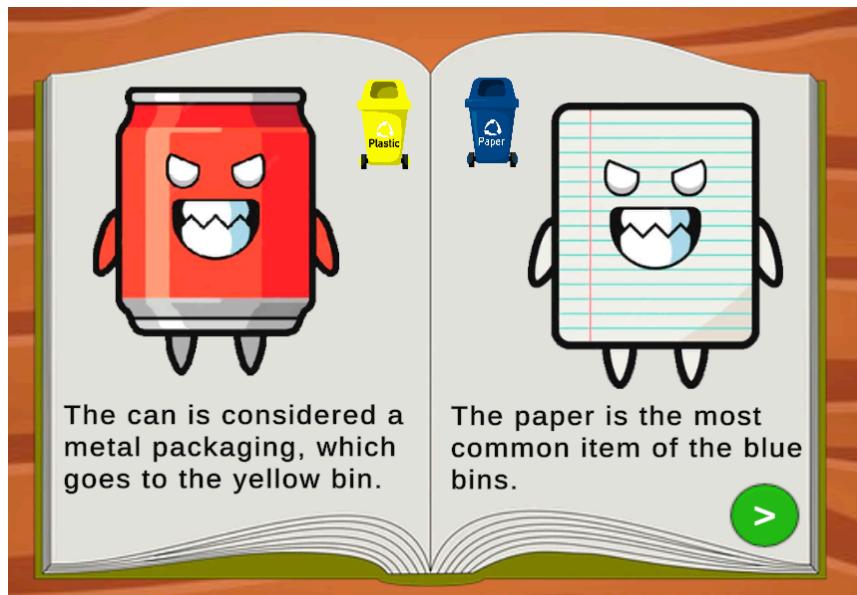
In the win/lose screen the points will appear only if the player wins. Also will appear 2 or 3 buttons:

- **Garbagepedia:** To open the garbagepedia.
- **Main Menu:** To go to the Title screen.
- **Next Level:** To go to the next level (Only if the player wins).



Garbagepedia

In the garbagepedia the player can see a description for every trashie and their corresponding container.





DYNAMICS

Based on the main mechanics of movement, grabbing trash and recycling it, the main strategy the player must follow is to decide which enemy to grab and what to do with it. This may vary depending on the situation, either because an enemy is faster, does more damage, is closer to its corresponding container or seed, etc.

If the player encounters a new trashee type and manages to recycle it, the information in the garbagepedia will be updated. Also, if the player wins or loses the game, he can access the garbagepedia to review and learn more about which trashee goes into which container. The information learned in the garbagepedia can be applied in the gameplay.

Once a bonus phase is passed, the player can choose between different power ups depending on his style of play or his previous experience in each of the levels.

The player can opt for a different way of playing depending on his objective, for example to focus on just surviving or to go for maximum points.



AESTHETICS

In terms of aesthetics, the fantastic and interesting world in which the game takes place can work as an attraction for the target user. Elements such as protecting a magic seed from garbage monsters can make the experience more entertaining and enjoyable.

To facilitate and focus the game also on learning, a fast and simple gameplay is implemented, where players can play in an enjoyable way and quickly learn the mechanics, thus focusing on correctly learning which container each type of garbage goes to.

Little by little the game will scale its difficulty, to make it a motivating challenge for the player, where his learning and mastering of the mechanics will be reflected.

Meanwhile, the player advances, with the help of Mother Nature, he will learn new things about recycling and its effects, improving his knowledge and making him feel more cultured and with more knowledge to share to somebody like his parents.

The player is motivated to complete the garbagepedia and have all the pages filled with useful information. Also, every time the player finds a new enemy, he feels curious about what the garbagepedia will say about it, making an interesting advance across the levels to discover new types of enemies.

As the player progresses through the different levels he will see how there is less and less garbage in the environment, thus motivating him even more to complete the mission and pass the game, gaining more knowledge about proper recycling.



VALIDATION CRITERIA

For the validation criteria, we will use three different methods to ensure the players have acquired knowledge:

- **The game itself:** In order to advance from level to level, the player needs to know which bin belongs to every garbage, because if the garbage is not well recycled, the player will lose the levels. So by compiling the data of how long it takes a group of players to reach the final level, we can know if our game is working or not.

- **The Garbage King:** The garbage king is the final boss of the game. The battle against him would be the validation criteria. The battle will consist of 5 phases. Before each phase, the Garbage King will ask the player some questions related to the topic of the game (not always the same questions), if the player fails, the world seed will receive 20 points of damage, which means if the player fails all the questions he will lose. Each phase will consist in 2 minutes recycling, with all the garbage types and containers. Every player that completes the game, is pretty sure that it has a good knowledge of recycling and its effects.

- **Test:** Finally, in case the game is used in a school, to ensure that the students have learned all the content that we expect that they learn (and if they didn't have enough time to complete the game), we will provide the schools some tests to test it. The test will consist of some questions that will be similar to the Garbage King questions, with some images of real garbage, so they can identify them in their normal lives.

FINAL REFLECTION

Design decisions	Relation to learning objectives
Grabbing Garbage	It shows how important it's to grab the garbage from the ground, because if the player doesn't do that, the planet will suffer.
Recycle	With this mechanic, the player learns how to classify the garbage and how important it is to do it well, because if the player doesn't do it well, the garbage will continue affecting the world.
Check the garbagepedia	With the garbagepedia, the player can ensure or consult knowledge about the garbage classification and which objects in real life go to every bin.
Clean the spaces	By cleaning the spaces of the bonus stages, the player can see the effect that recycling has on the world, encouraging him to do it to see beautiful landscapes and animals in real life.
Rules	The win condition depends on if the player recycles well, so in order to win he needs to understand the classification of the waste.
Resources	With all the resources together (seed HP, Points, Bins...) the player can understand that recycling is good and apports and benefits the world's life
Fiction / Narrative	By putting the player in the situation of this alternative Earth, it makes the player recognize the environmental impact that not recycling correctly can have.
Mother Nature	She acts as an educator that helps the player, so she teaches the correct way to recycle and how it affects the world, and encourages the player to do it.
Trashees	Putting the trashees in their corresponding containers helps the player to understand the correct classification of waste, one of the main objectives of the game.
Garbage King	The Garbage King's quiz-like questions help the player test their knowledge and learn about more specific cases, such as wet paper cannot go in the blue garbage can. This helps the player better understand how to recycle and apply it in real life.
Dynamics	The dynamics allow the player to learn correct waste classification through active decisions and the updating of the garbagepedia. Proper recycling positively impacts the environment, motivating the player with rewards and power-ups. The practical application of this knowledge is encouraged by transferring what is learned to real-life contexts.
Aesthetics	The feeling that causes to win the game, gain more knowledge and understand some things about recycling, encourages the player to recycle and spread their knowledge to the others, which are objectives of this game.

REFERENCES

Market Study

- [22 Fun and Free Recycling Games for Schools | PepsiCo Recycle Rally](#)
- [Clean and green | LearnEnglish Kids](#)
- [Recycle Roundup | National Geographic](#)
- [Litter Critters | ABCya!](#)
- [Recycling Waste | TurtleDiary](#)
- [Recycling Sorting Game | Eco-Cycle](#)
- [10 videojuegos que fomentan el cuidado del medio ambiente - NoticiasAmbientales](#)
- [The Recycling Heroes - Hola.com](#)
- [Alba: A Wildlife Adventure](#)
- [Eco](#)
- [Minecraft: Education Edition – Sustainability City](#)
- [Plasticity](#)
- [The Recycling Heroes](#)

Design

- [La importancia de conocer los colores de los contenedores de reciclaje - ecoembes](#)
- [A Serious Game Design Assessment Framework by Konstantin Mitgutsch and Narda Alvarado - MIT Libraries](#)

Assets resources

- [Pixabay](#)
- [Fleepik](#)
- [YouTube](#)
- [Free Pixel Art Character - The Mana Seed "Character Base" by Seliel the Shaper - itch.io](#)
- [Rainbow Item Seed - Trials of Mana](#)

Validation criteria

- □ TEMA 5-VALIDACIÓN DE SERIOUS GAMES
- [Serious Games Evaluation: Processes, Models, and Concepts by Katharina Emmerich and Mareike Bockholt](#)