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Deliverable 2.5
Ecological Golf Training Footprint Game

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Executive Summary

The Ecological Golf Training Footprint Game, EcoGolfer, has been developed to raise awareness among young golfers (ages 14-19) and their coaches about the environmental impact of their activities on the golf course and it is result of Task 2.7. This deliverable presents the design and development of EcoGolfer, a narrative-driven serious game that simulates real-world golf scenarios. Players make choices related to transportation, course mobility, waste management, and equipment use, all of which contribute to their carbon footprint. The game calculates this footprint and translates it into the number of trees required to offset their environmental impact.
EcoGolfer consists of four scenarios and includes an Eco Rank leaderboard, allowing players to compare their environmental footprint with others and track their progress in making greener choices.

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List of Acronyms and Abbreviations

Term	Description
2D	Two-Dimensional

1. Introduction

1.1 Scope and objectives of the deliverable

The objective of this deliverable is to present the process of designing the Ecological Golf Training Footprint Game along with its implementation. The Ecological Golf Training Footprint Game is a narrative-driven serious game intended to educate golf players (aged 14-19) and their coaches about the environmental impact of their training activities. By simulating realistic golf-related scenarios, the game encourages players to make informed decisions that affect their carbon footprint. It aims to help young golfers and coaches develop more sustainable training practices, ultimately contributing to environmental conservation efforts.

1.2 Structure of the deliverable

The present deliverable is split into three main chapters:

- Introduction
- Design of the Ecological Golf Training Footprint Game
- Development of the Ecological Golf Training Footprint Game

2. Design of the Ecological Golf Training Footprint Game

2.1 General Information

The Ecological Golf Training Footprint Game is a two-dimensional (2D), narrative-driven/ telltale serious game, similar to the example shown in Figure 1. It is designed for both coaches and golf players aged 14 to 19. The game features realistic learning scenarios derived from various golf-related cases and contingencies, aiming to engage players in situations where they must make decisions or respond to questions intended to influence their knowledge, attitudes, and beliefs regarding the ecological footprint.

Based on the choices made during gameplay, the system calculates each player's carbon footprint and represents it as the number of trees required per month to offset their impact. Additionally, the game provides players with tailored suggestions and tips on how to reduce or offset their carbon footprint.

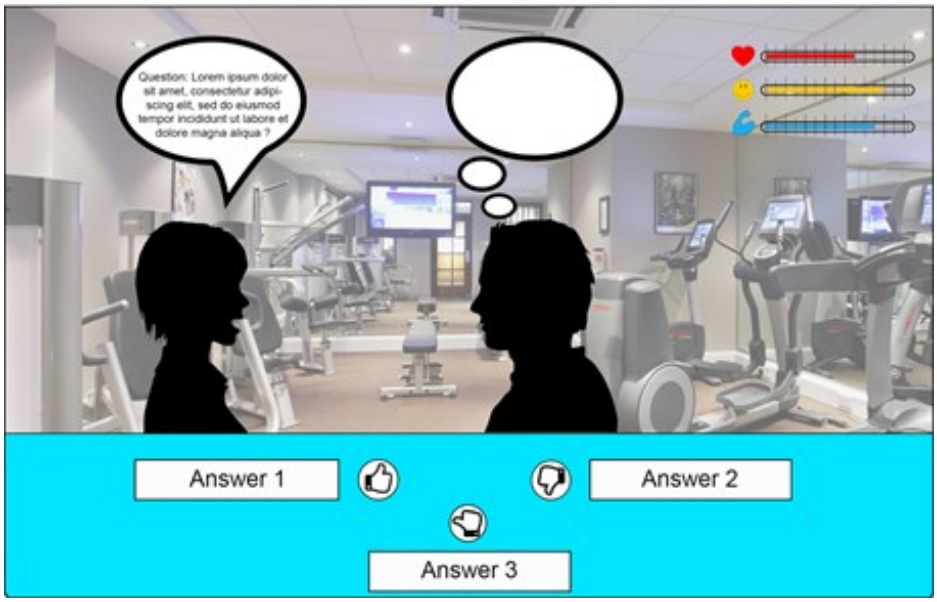


Figure 1. Example of a 2D narrative-based game

The game consists of a register/login screen, where users must create an account if they do not already have one, and then login using their credentials. The main menu screen allows users to start playing the game, edit their profile, or view their ecological footprint based on their gameplay, as well as their rank compared to other players. Finally, the main game screen enables users to select a scenario and begin playing.

2.2 Game Scenarios and Footprint Calculator

Golf experts contributed to defining the areas and questions used to calculate a golfer's carbon footprint, as well as to developing the scenarios based on these questions. The game's storyline follows a day in the life of a golfer, focusing on aspects such as transportation, waste, and golf equipment.
In total, four scenarios were designed, which are presented as follows.

2.2.1 Scenario 1: Planning a Trip to the Golf Course

Background:
In this game you are Alex. Alex is excited about playing golf as much as possible. They've been working on improving their game, but recently, they've also become more conscious of the environmental impact of their actions, both on and off the course. Mr. Thompson, the course manager, is passionate about sustainability and encourages players to consider their environmental footprint.

Setting: Alex's Home, Early Morning

It's a beautiful Saturday morning, and the sun is already shining brightly through Alex's window. Excited for a day at the golf course, Alex sits at the kitchen table with a cup of coffee, looking over a checklist shared by Mr. Thompson, the golf course manager. The list provides tips on eco-friendly golfing, encouraging players to be mindful of their environmental footprint. Inspired, Alex decides to carefully plan the day, ensuring it's both enjoyable and environmentally conscious.

Choice 1: Distance Traveled to the Golf Course

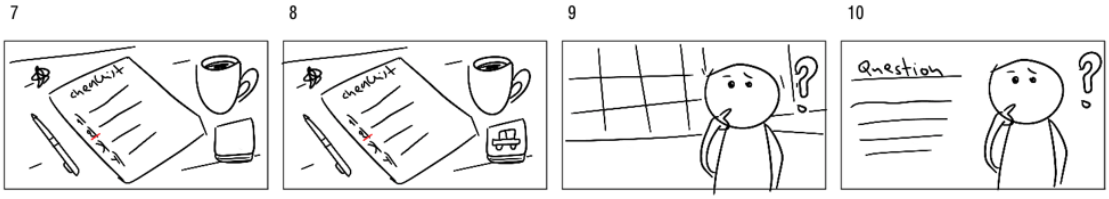
Context: Alex considers the distance to the course that he is going to make.

Question: *How far do you travel to reach the golf course? (Enter number of kilometers)*

Feedback based on the answer of the user:

1. **Less than 50 km**
   "I chose a closer course to keep my travel footprint low. It's more convenient and better for the environment."

2. **50-100 km**
   "This course is a bit further away, but the drive isn't too long. I'll be mindful of my impact during the trip."
3. **100-200 km**
   "I have to travel quite a distance for this course, which isn't ideal. I'll make sure my choices at the course balance this out."
4. **More than 200 km**
   "I have to travel a long way to play here. This trip will have a big environmental impact, so I'll look for ways to make up for it."



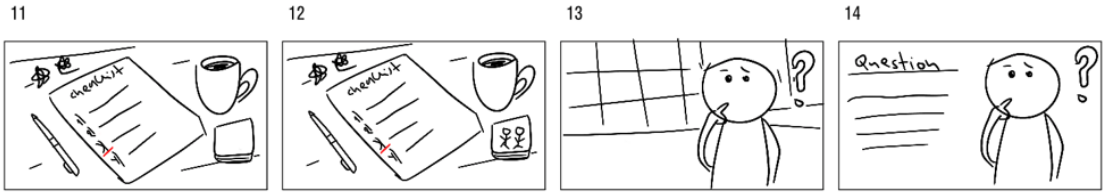
Choice 2: Mode of Transportation

Context: Alex considers how to get to the course. They think about the pros and cons of each option, from walking or biking to driving or taking public transport. Mr. Thompson's guide reminds them that the mode of transport is a major factor in their environmental impact.

Question: *How do you travel to the golf course? (Enter distance in kilometers for each method used)*

Options *(with feedback)*:

1. **Foot**
   "Walking here keeps my environmental impact at zero! It's healthy, too."
2. **Bicycle**
   "Biking to the course gives me exercise and has no carbon impact. A great choice all around."
3. **Motorcycle**
   "Taking the motorcycle is a quite good option."
4. **Car (Electric)**
   "Taking an electric car reduces my footprint while keeping the trip comfortable."
5. **Car (Petrol)**
   "I will use a petrol car, which isn't the most eco-friendly, but I'll aim to be more mindful of my other choices."
6. **Car (Diesel)**
   "I will use a diesel car, which isn't the most eco-friendly, but I'll aim to be more mindful of my other choices."
7. **Bus**
   "Public transit reduces emissions per person, so it's a good option for an eco-conscious trip."
8. **Train**
   "Public transit reduces emissions per person, so it's a good option for an eco-conscious trip."
9. **Plane**
   "Flying here has a major carbon impact. I'll look for ways to offset this and make greener choices next time."



Choice 3: Traveling Alone or with Others

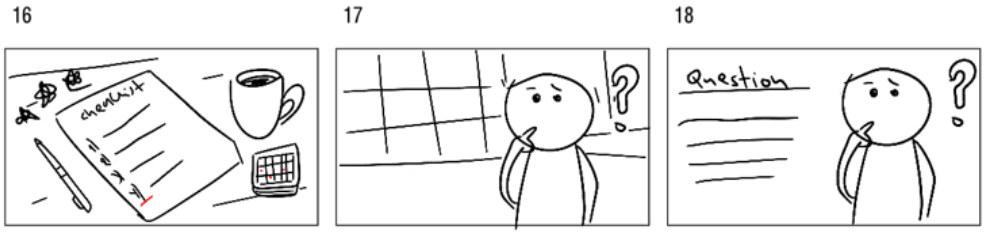
Context:
Mr. Thompson's guide emphasizes carpooling as an easy way to reduce individual carbon footprints. Alex thinks about whether they can coordinate with friends or if traveling alone will be their only option.

Question: *Do you travel alone?*

Options *(with feedback)*:

1. **No**
   "Carpooling reduces the impact per person. It's a simple way to make a difference."
   A. **Question**: *With how many others do you share your vehicle?*

2. **Yes, traveled alone**
   "Traveling solo in a car adds to my carbon footprint. I'll consider carpooling next time if possible."
   A. **Would you consider carpooling next time? (if traveled alone)**
      1. **Yes**
         "I'll look into carpooling to reduce my impact in future trips."
      2. **No**
         "I'm choosing to travel solo, even if it means a higher footprint."



Choice 4: Frequency of Visits

Context:
Reflecting on how often they visit the golf course, Alex realizes that frequent trips might increase their overall carbon footprint. They wonder if spacing out visits could make a meaningful difference in their environmental impact.

Question: *How often do you visit the golf course?*

Options *(with feedback)*:

1. **Once per month**
   "Limiting my visits helps reduce my overall impact, making each game more special."
2. **2 times per month**
   "I enjoy playing often, but I'll be mindful of the impact of frequent travel."
3. **3 times per month**
   "I enjoy playing often, but I'll be mindful of the impact of frequent travel."

4. **4 times per month**
   "Frequent visits mean a higher travel footprint, so I'll look for ways to offset this impact."
5. **5 times per month**
   "Frequent visits mean a higher travel footprint, so I'll look for ways to offset this impact."

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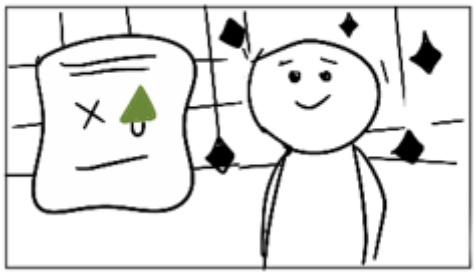

Carbon Offset Suggestion

"To offset your carbon footprint, you would need to plant approximately X trees per month."

Alex gains insight into how their everyday travel habits can impact the environment and learns practical ways to reduce their footprint while enjoying golf responsibly.

2.2.2 Scenario 2: Moving Around the Golf Course

Setting: Alex has arrived at the course and is well into the game. The morning air is crisp, and the first eight holes have gone smoothly. As Alex approaches the 9th hole, the golden light of the late morning sun casts a beautiful glow over the lake near the fairway. Birds chirp in the distance, and small animals dart through the tall grass at the edges of the course. Just as Alex tees up, Mr. Thompson appears in a golf cart, greeting Alex warmly.

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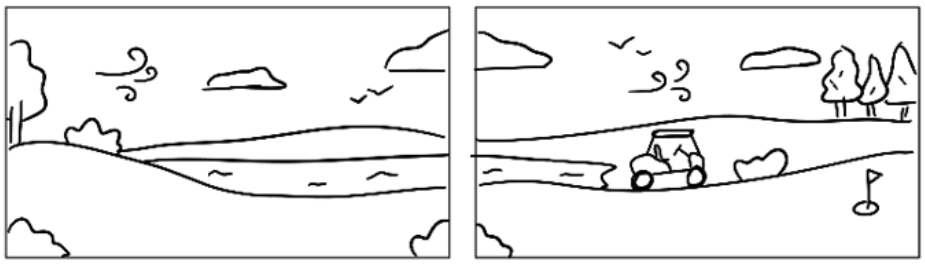
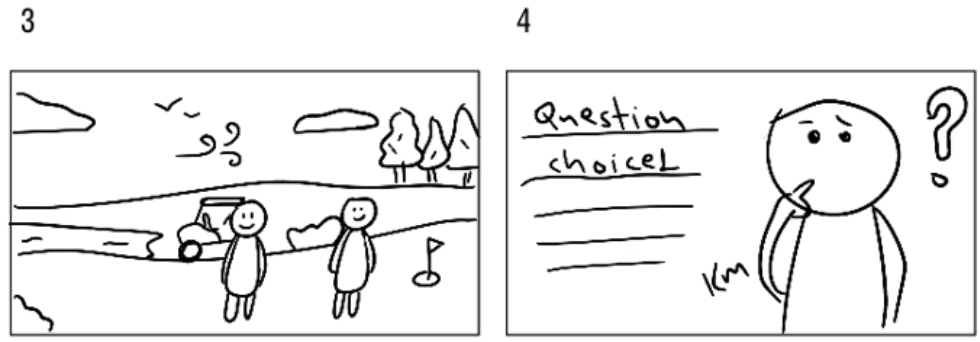


Dialogue:

Mr. Thompson:
"Beautiful, isn't it? This course is special not just for its challenge but for the life it supports. But every decision you make out here has a ripple effect on the ecosystem. You're about to play the most important hole on the course — the 9th. It's a tough one, but remember, it's not just about your golf score here. It's about keeping the land alive. I'll leave you to it."

Alex (inner monologue):
"This course is incredible, but I'm starting to understand it's more than just a game. Let's see what this next hole has in store."



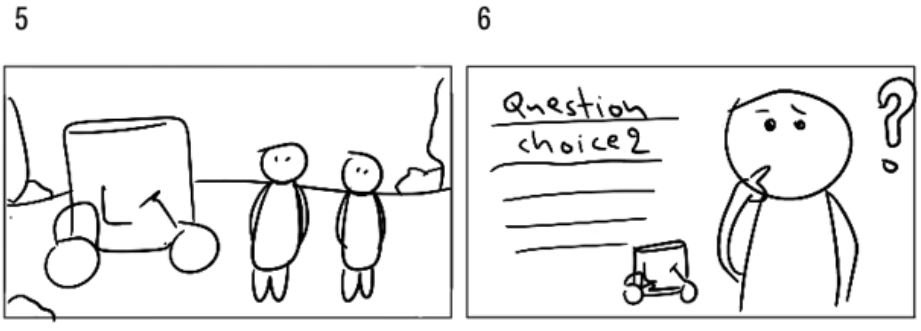
Choice 1: Distance Moved Around the Course

Context:
While reviewing their play so far, Alex considers how much ground they've covered. Mr. Thompson's earlier advice about energy use and its connection to environmental impact echoes in their mind.

Question: *What is the average distance that you move around the golf course?*

Feedback:

1. **0-5 km**
   "By keeping my movement within a small area, I'm minimizing energy use and my environmental footprint."
2. **5-10 km**
   "This distance allows me to play freely without overextending my travel across the course."
3. **10-15 km**
   "I'm covering more ground than usual today, which means I need to be more aware of how much energy I'm using."
4. **More than 15 km**
   "This much travel is definitely harder on the environment. I'll have to be more cautious with my eco choices moving forward."



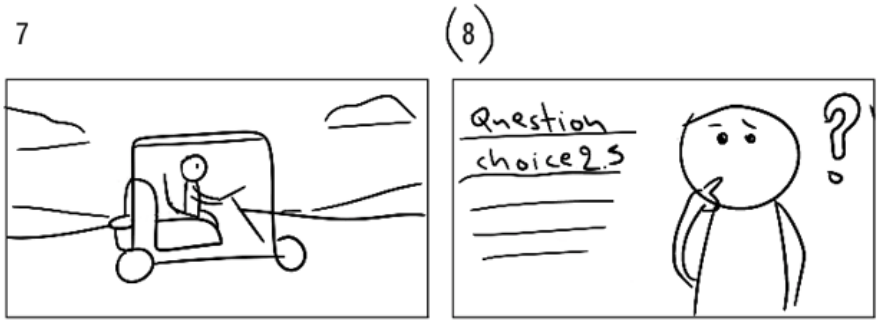
Choice 2: Mode of Transportation

Context:
The course offers options for getting around, from walking to using a golf cart. Alex remembers Mr. Thompson's suggestion to balance convenience with eco-conscious choices.

Question: *How do you move around at the golf course?*

Options *(with feedback)*:

1. **By Foot**
   "Walking keeps my environmental impact to a minimum while helping me stay connected to the course's natural beauty."
2. **Using a Golf Cart**
   "Using the cart today saves time, but I'll make sure it doesn't affect the course negatively by opting for a greener model."
3. **Combination of Foot and Cart**
   "Mixing walking with using the cart is a good compromise between conserving energy and protecting the environment."

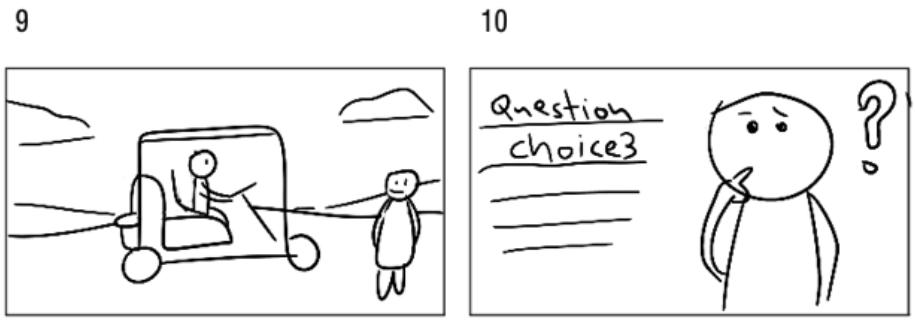


Choice 2.5: Fuel Type for the Golf Cart (If Applicable)

Context:
If Alex chooses to use a cart, they think about the environmental implications of the cart's fuel type. Electric carts, Mr. Thompson had explained, are the most sustainable option.

Question: *What type of fuel does your golf cart use?*

1. **Electric**
   "The electric cart is a sustainable choice, allowing me to get around without polluting or damaging the course."
2. **Benzine**
   "I'm using a gas-powered cart today, which isn't ideal for the environment, but I'll try to compensate with other eco-friendly choices."
3. **Diesel**
   "The diesel cart isn't great for the environment. I'll have to be more eco-conscious elsewhere on the course."

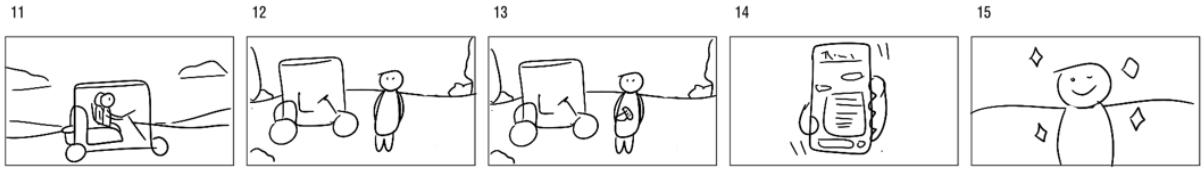


Choice 3: Sharing the Golf Cart

Context:
Alex notices another golfer heading the same way and considers whether sharing the cart would make the trip more efficient and eco-friendly.

Question: *Do you use the golf cart alone?*

1. **No**
   "Carpooling on the cart helps reduce the environmental impact per person, which is a simple yet effective choice."
   A. **Question**: *With how many do you share the golf cart?*
2. **Yes, used the cart alone**
   "Using the cart alone adds to my personal carbon footprint. Next time, I'll consider sharing the ride to lower my impact."
   A. **Question**: *Would you consider sharing it next time?*
      1. **Yes**
         "I'll look into sharing next time to make my round of golf a bit greener."
      2. **No**
         "I value the convenience of going solo, even if it means a higher footprint."



Feedback at the End of the Round

As Alex completes the round and returns the golf cart, they receive a message on their phone from Mr. Thompson:

Feedback:
"Great job today, Alex! Based on your choices, your time on the course resulted in a carbon footprint that would need about X trees per month to offset. Small steps, like walking when you can and sharing transportation, really do add up. Consider ways to further reduce your impact next time—together, we can make golf more sustainable for everyone who enjoys this beautiful game!"

The message leaves Alex feeling both proud of the efforts they've made and motivated to continue making eco-friendly choices. As they pack up, they realize that every thoughtful decision—whether on the course or in how they got there—plays a part in preserving the environment they love.

2.2.3 Scenario 3: Reducing Waste on the Golf Course

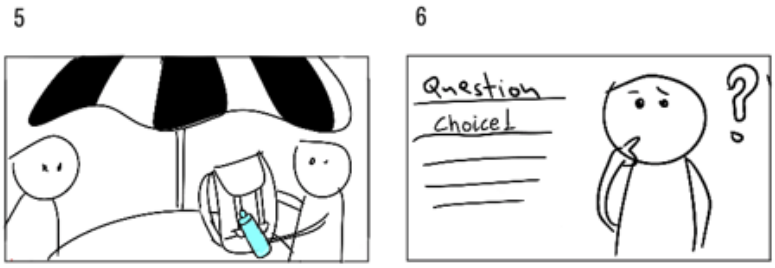
Setting: After completing the first half of the course, Alex takes a break at the clubhouse to hydrate and grab a quick snack. The clubhouse buzzes with activity, as other golfers discuss their rounds over light refreshments. Near the entrance, Mr. Thompson is setting up a display about the course's sustainability initiatives, including new water dispensers and recycling bins. Spotting Alex, he waves and walks over to discuss ways golfers can help reduce waste during their visit.

Dialogue:

Mr. Thompson:
"Hey Alex, today has been a warm day, so make sure you stay hydrated. We've added water dispensers around the course and encourage players to use refillable bottles when possible."

Alex:
"Thanks, Mr. Thompson! I usually bring my own bottle, but I wasn't sure about refill options. It's good to know you're adding dispensers—it's a great way to cut down on plastic waste."

Mr. Thompson:
"That's right! We're hoping players can help us reduce waste on the course by being mindful of recycling and using our refill stations. I'd love to hear any feedback you have after today's round."



Choice 1: Water Bottle Type

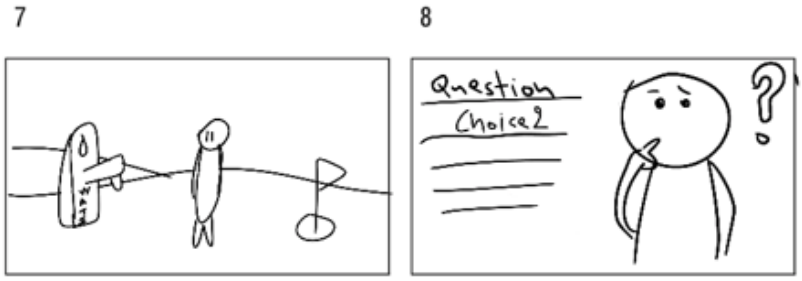
Context:
Before heading out for the back nine, Alex checks their bag. They brought a bottle, but the type—reusable or plastic—makes a difference in waste reduction.

Question: *Did you bring a refillable bottle or a plastic one?*

Options *(with feedback)*:

Feedback:

1. **Refillable Bottle**
   "I'm glad I brought my refillable bottle. Using this means I won't need to buy plastic bottles or contribute to extra waste on the course."
2. **Plastic Bottle**
   "I brought a plastic bottle today, but I'm starting to think I should switch to a reusable one. It'd be a small change with a big impact on reducing waste."



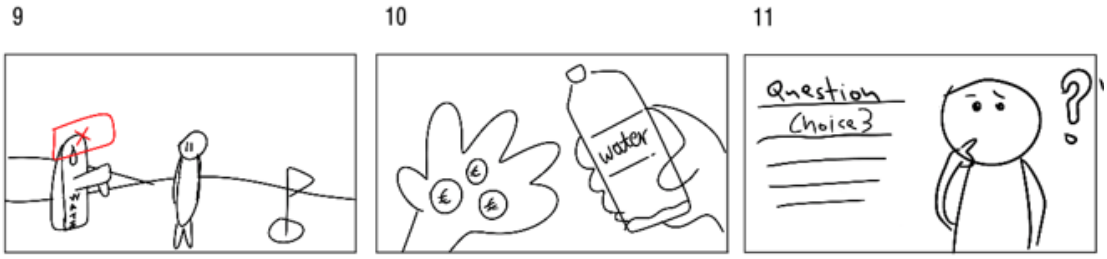
Choice 2: Water Availability on the Course

Context:
Alex spots water dispensers at the next hole and reflects on how convenient they are for refilling bottles and avoiding plastic waste.

Question: *Does the course provide water dispensers?*

Options *(with feedback)*:

1. **Yes**
   "Having these water dispensers around the course is really convenient. I can refill my bottle without buying anything extra, which helps me stay hydrated and eco-friendly."
2. **No**
   "It's unfortunate that there aren't any water dispensers available. Without refill options, I might end up having to buy water in disposable bottles, which isn't ideal."



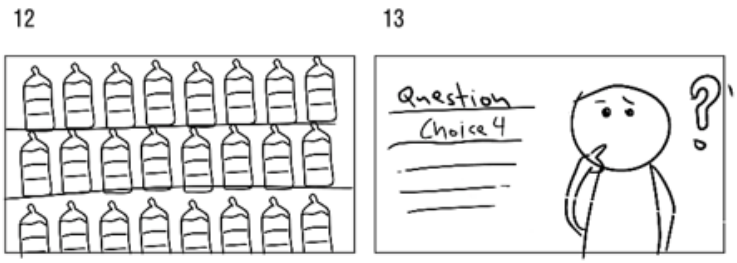
Choice 3: Buying Water on the Course (if dispensers are not available)

Context:
If dispensers aren't available, Alex might need to buy water. They think about how this could add to plastic waste and the importance of proper recycling.

Question: *If there are no water dispensers, do you buy water at the course?*

Options *(with feedback)*:

1. **Yes**
   "I'll have to buy a bottle to stay hydrated, but I'll make sure to recycle it if I can."
2. **No**
   "I'll skip buying water this time. I'll need to plan better next time and bring enough from home to avoid extra plastic waste."



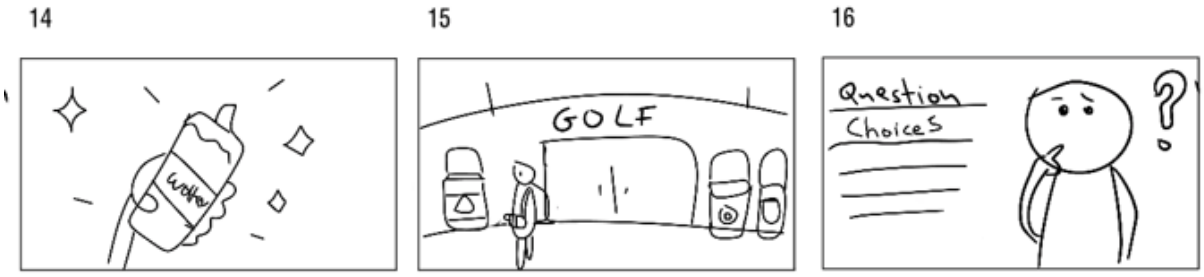
Choice 4: Type of Bottled Water Provided by the Course

Context:
If Alex buys water, they notice whether the course offers plastic or glass bottles, reflecting on how these materials impact sustainability.

Question: *If you buy water on the course, is it provided in plastic or glass bottles?*

Options *(with feedback)*:

1. **Plastic Bottles**
   "I'd prefer a more eco-friendly option, but this is all that's available. I'll make sure to dispose of it properly."
2. **Glass Bottles**
   "Glad to see glass bottles as an option! They're easier to recycle, and they reduce the amount of plastic waste on the course."



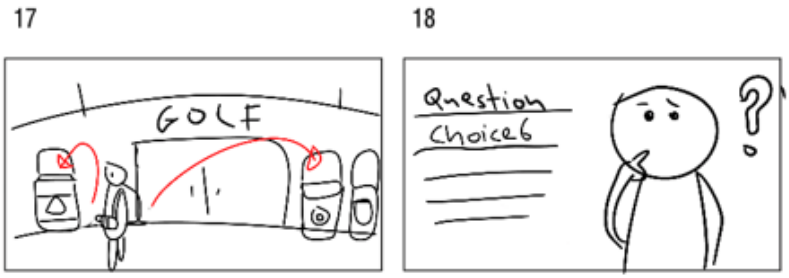
Choice 5: Handling Waste

Context:
As Alex finishes their drink or snack, they must decide how to dispose of their waste, considering whether recycling bins are available.

Question: *How do you handle your waste?*

Options *(with feedback)*:

1. **Recycle**
   "I always recycle whenever I can. Knowing my waste won't end up in a landfill makes me feel better about using disposables."
2. **Garbage**
   "Unfortunately, I had to throw everything in the trash this time. I'll aim to plan better and bring reusable items next time."



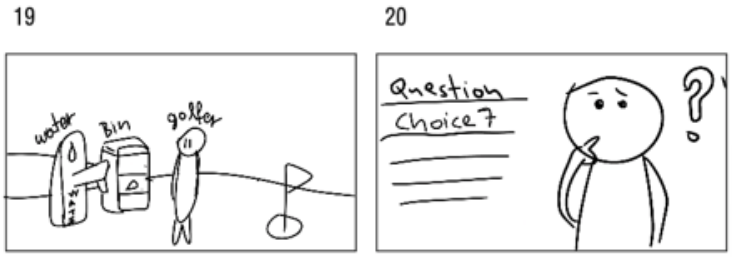
Choice 6: Recycling Facilities on the Course

Context:
Alex notices whether recycling bins are strategically placed around the clubhouse and course, reflecting on how the course supports responsible waste management.

Question: *Do you find appropriate facilities for recycling at the golf course?*

Options *(with feedback)*:

1. **Yes**
   "Seeing recycling bins around the course makes it easy to dispose of my waste responsibly. It's great that the course encourages sustainable practices."
2. **No**
   "Without recycling bins, I had to throw everything in the garbage, which feels wasteful. I'll mention it to Mr. Thompson to see if more bins can be added."



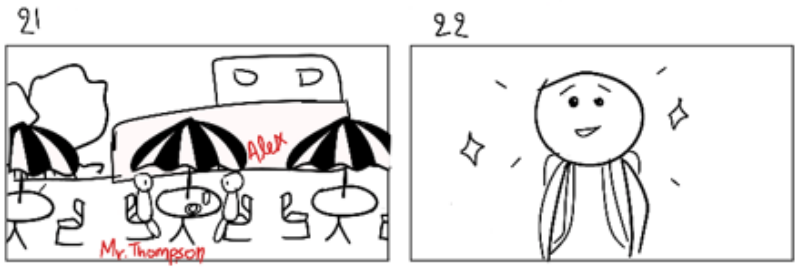
Choice 7: Free Water with Green Fee

Context:
Alex hears a fellow golfer mention whether water is included in the green fee and considers how this impacts the overall golfing experience and waste reduction.

Question: *Does the course provide free water with the green fee?*

Options *(with feedback)*:

1. **Yes**
   "It's great that water is included. It encourages players to stay hydrated without having to buy extra bottles, which helps cut down on waste."
2. **No**
   "Paying extra for water adds up and leads to more plastic waste. It'd be great if this was included with the green f1ee."



Feedback from Mr. Thompson

At the end of the round, Alex returns to the clubhouse and finds Mr. Thompson waiting.

Mr. Thompson:
"How did it go today, Alex? Were the water dispensers and recycling facilities easy to find? We're working hard to make this course as sustainable as possible."

As Alex leaves the course, they feel encouraged to continue making small changes to reduce waste and stay hydrated responsibly on future rounds. Mr. Thompson's commitment to sustainability inspires Alex to be more mindful, both on and off the course.

2.2.4 Scenario 4: Golf Equipment Choices

Setting: Following the break, Alex stops by the equipment area to pick up some supplies before heading back to finish the remaining holes. The equipment room is well-organized, offering a variety of clubs, balls, and tees. Mr. Thompson, always eager to educate, approaches Alex with a smile and begins a conversation about the sustainability of golf equipment. Together, they explore options that align with Alex's game and the goal of reducing environmental impact.

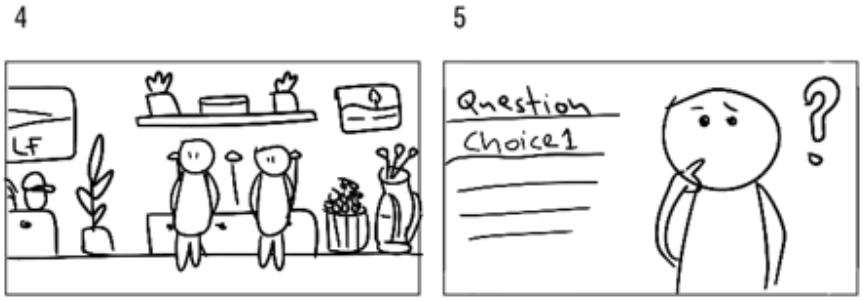
Dialogue:

Mr. Thompson:
"Alex, it's always a pleasure to see you! I've been meaning to chat with you about equipment choices. Many players don't realize that the kind of gear they use can have a real impact on the environment."

Alex:
"That's interesting. I usually just pick whatever looks good and performs well, but I hadn't thought about how equipment could affect the course or the environment. What are some things to consider?"

Mr. Thompson:
"Well, it can range from the type of golf balls and tees you use to how often you replace your clubs. Let's take a closer look—you may find some small ways to make a big difference!"

Alex nods, intrigued by Mr. Thompson's perspective, and they begin discussing various equipment choices.



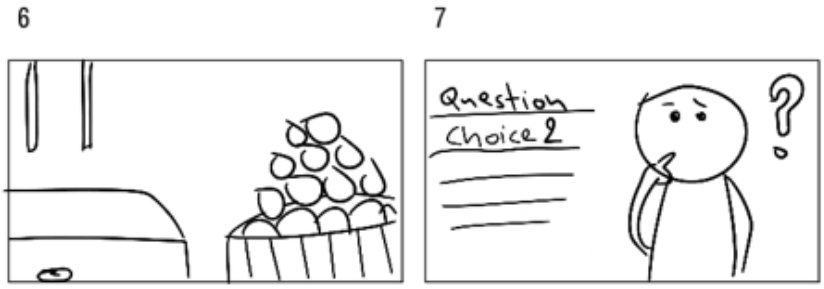
Choice 1: Own or Rent Equipment

Context:
Alex thinks about whether bringing their own clubs or renting from the course is more sustainable. Mr. Thompson mentions that owning equipment can reduce the need for frequent production.

Question: *Do you have your own golf equipment, or do you rent it from the course?*

Options *(with feedback)*:

1. **Own**
   "Having my own equipment is convenient and saves resources compared to renting regularly. Plus, I can choose more sustainable items when I purchase."
2. **Rent**
   "Renting equipment might use more resources over time, but it also means I'm not adding to equipment production. I'll keep this in mind as an option for sustainability."



Choice 2: Average Number of Golf Balls Lost Per Round

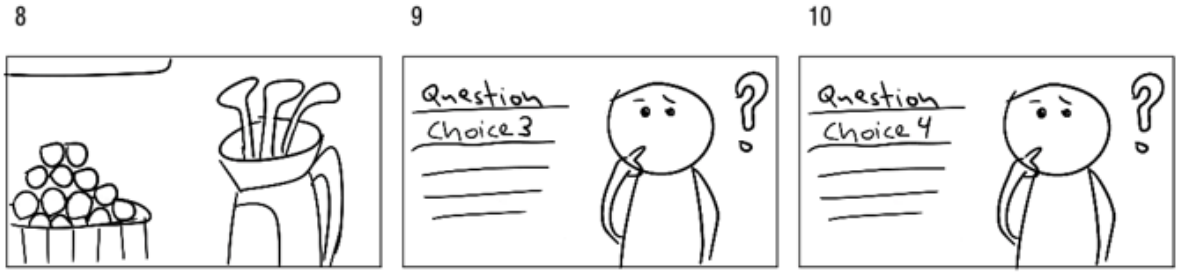
Context:
Reflecting on past games, Alex considers their accuracy and how often they lose balls, realizing that lost balls can harm the environment if left in natural areas.

Question: *How many golf balls do you lose on average during a round?*

Options *(with feedback)*:

1. **Less than 1 per round**
   "I try to keep my shots accurate to avoid losing balls. This helps reduce waste, especially since lost balls can sometimes harm the environment."

2. **1 per round**
   "Losing one ball isn't ideal, but it happens. I'll be more mindful to cut down on this and reduce waste."
3. **2 per round**
   "Two balls a round adds up over time. I'll work on improving my accuracy so I can reduce the number of balls I lose."
4. **3 per round**
   "Losing three balls every round means a lot of waste. Maybe I can find a better balance between my game and reducing lost equipment."
5. **More than 3 per round**
   "Losing more than three balls every round isn't great for the environment. I'll consider using eco-friendly balls or focusing on improving my accuracy."



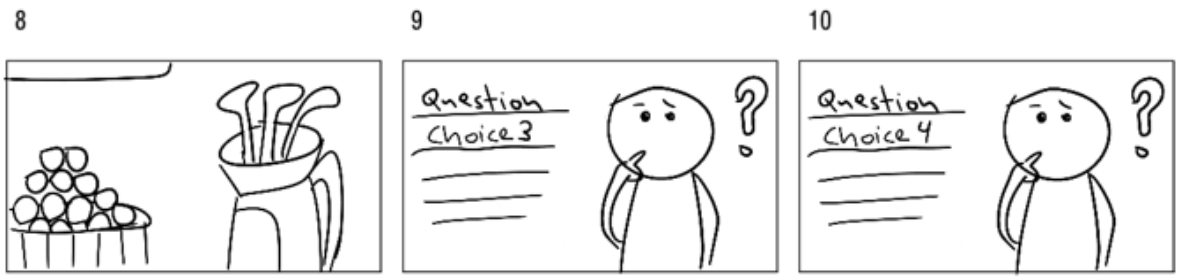
Choice 3: Frequency of Changing Golf Clubs

Context:
As Alex looks at new clubs on display, they think about how often they replace their current set and whether extending their use could save resources.

Question: *How often do you change your golf clubs?*

Options *(with feedback)*:

1. **Once per year**
   "I upgrade my clubs every year, but I wonder if I could extend their life a bit longer. It might save resources in the long run."
2. **Once every 2 years**
   "Replacing clubs every two years keeps my equipment updated without too much impact. I'll try to maintain my current set well to make it last."
3. **Once every 3 years**
   "I try to make my clubs last a few years before upgrading. It's a good way to reduce waste and save resources."
4. **More than 3 years**
   "I only replace my clubs when absolutely necessary, which helps cut down on waste. I'll keep this approach to keep my footprint low."

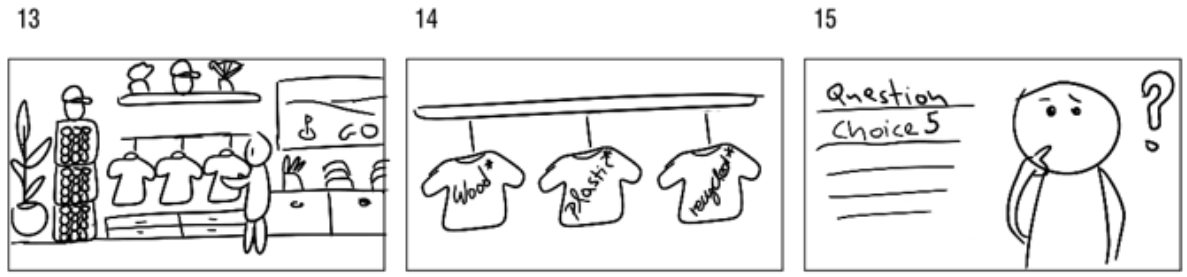


Choice 4: Type of Golf Balls Purchased

Context:
Alex considers whether to buy new balls or opt for used ones, prompted by Mr. Thompson's suggestion that reused balls can still perform well while reducing waste.

Question: *Do you buy new or used golf balls?*

1. **New**
   "New balls perform well, but maybe I should consider used balls to save resources. It's something I'll think about."
2. **Used**
   "Buying used balls is a smart way to reduce waste and reuse resources. I'm glad it's an option available."

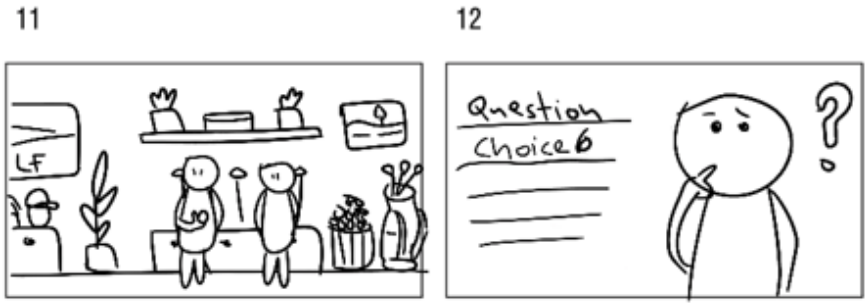


Choice 5: Type of Tees Used

Context:
While selecting tees, Alex notices options made of wood, plastic, and recycled materials, reflecting on which would be the most sustainable choice for the round.

Question: *What kind of tees do you use?*

1. **Plastic Tees**
   "Plastic tees last a while, but they're not the best for the environment. I'll consider switching to biodegradable options."
2. **Wooden Tees**
   "Wooden tees are a good choice—they break down naturally and don't harm the course. I'll keep using them."
3. **Tees Made from Recycled Materials**
   "Tees made from recycled materials give me a sustainable option that I feel good about using."



Choice 6: Using Dissolvable Golf Balls

Context:
Mr. Thompson shows Alex a new type of dissolvable golf ball designed for water hazards, explaining that these break down naturally to minimize environmental impact. Alex weighs performance against sustainability.

Question: *Would you be willing to use golf balls that dissolve in water but decrease performance slightly?*

1. **Yes**
   "If using dissolvable balls means less impact on the environment, it's worth the small trade-off in performance."
2. **No**
   "I'm hesitant to sacrifice performance. I'll consider other ways to reduce my impact instead."

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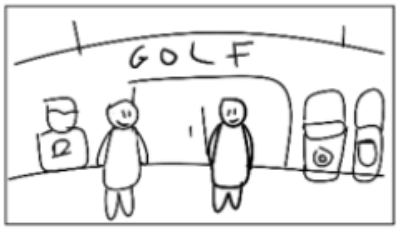

Feedback from Mr. Thompson

After Alex makes their equipment choices, they meet Mr. Thompson outside the clubhouse.

Mr. Thompson:
"Well, Alex, I hope today's round has you thinking about how equipment can impact the course and beyond. Did any of these choices surprise you?"

As Alex heads out for their round, they feel more motivated to be mindful of their equipment choices, knowing that each decision can contribute to a more sustainable game. Mr. Thompson's guidance has given Alex fresh insights on making golf a little greener, one round at a time.

3. Development of the Ecological Golf Training Footprint Game

This paragraph presents the two main components of the game: (a) the main game along with the 4 scenarios, and (b) the ECO RANK, which describes the rationale of the footprint calculator.

3.1 Main Game

The game, called "EcoGolfer", is available online at http://games.csd.auth.gr/G4C/ and as a mobile application on the Play Store (https://play.google.com/store/apps/details?id=com.SWITCHGames.EcoGolfer) by searching for its name. The game is also linked to the project's web-based platform.
When a player opens the game, they are prompted to enter their credentials on an authentication ("Login") screen, as shown in Figure 2.
New users must first create an account by selecting the "Register" option before logging in. During the registration process (Figure 2), they must provide personal details such as their username, age, gender, country of residence, and email address. However, only the username and email are required. Additionally, they need to set a password to secure their account. Once all required information is submitted, the account is created, granting access to the game.

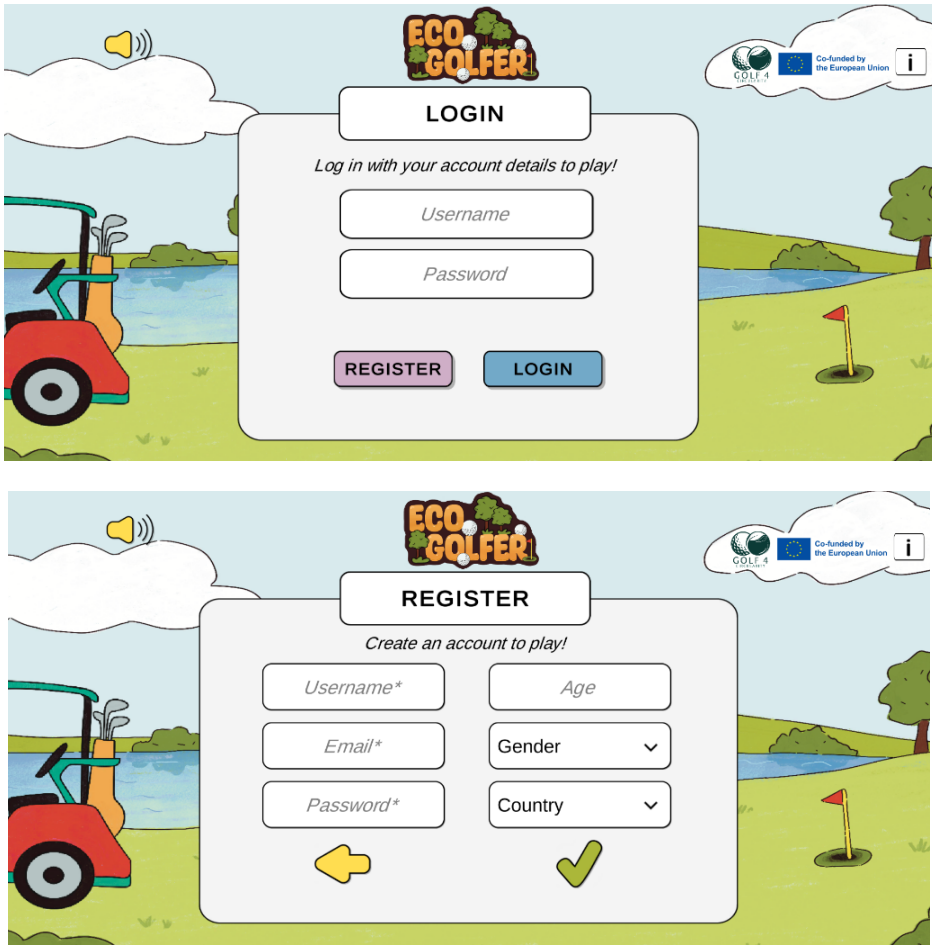

Figure 2. Login and Registration Forms

After signing in, players can access the main menu (Figure 3), where several options are available. The “PLAY” button allows them to explore the four developed scenarios. The “OPTIONS” button directs users to their personal profile, where they can update their information, except for their username and email. The “ECO RANK” button displays a ranking screen that compares the player's footprint with other players. Lastly, the “LOGOUT” button allows players to disconnect from their account, after which the game redirects them to the login screen.

Figure 3. Main Menu

Once a player selects the “PLAY” button, the available scenarios appear, each represented by a title (Figure 4). These scenarios are independent of one another, allowing players to engage with them in any order. However, if the player follows the correct order, from one to four, they will experience a continuous story about a golfer named Alex, spending a day with him. The first two scenarios focus on transportation-related carbon footprints, with the first covering arrival at the golf course and the second focusing on moving around the course. The third scenario

highlights waste-related carbon footprints, while the fourth addresses golf equipment carbon footprints. The game brings the scenarios described in Section 2.2 to life through its graphics, animations, and sounds.

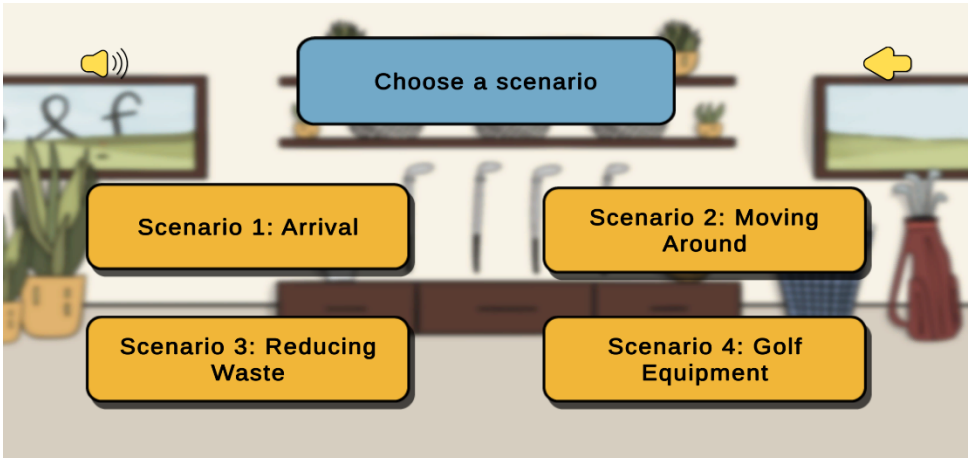

Figure 4. Scenario Selection Screen

During gameplay, the name of the speaking character appears in the top right corner of the dialogue box, along with their image (Figure 5).

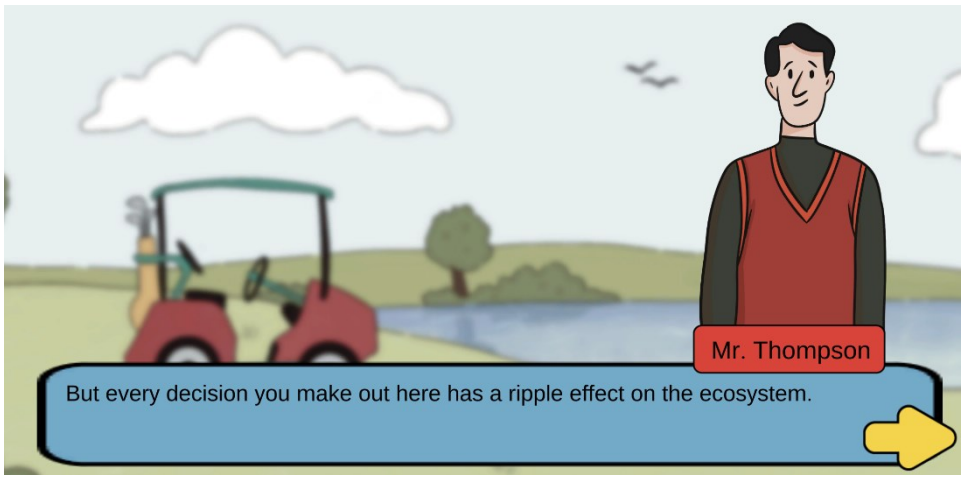

Figure 5. Dialogue Box with a Character Speaking

If no name is displayed, the dialogue box typically contains background information, as shown in Figure 6.

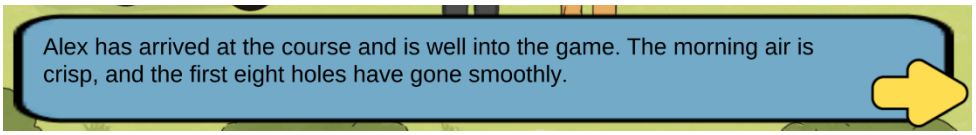

Figure 6. Dialogue Box with No Name Displayed

Each scenario includes a question-and-answer section (Figure 7), where players must respond to questions based on their real-life actions or the numerical values they would like to see reflected in their carbon footprint results. Each user's response contributes to the calculation of their carbon footprint. Additionally, based on the player's answer, an appropriate message appears on the screen, explaining the environmental impact of their choice and offering suggestions or tips on how to reduce or offset their carbon footprint (Figure 7).

Figure 7. Question and Feedback Example

The game calculates the player's carbon footprint based on their answers and displays the result in terms of the number of trees required per month to offset their impact. A message appears stating, "To offset your carbon footprint, you would need to plant approximately X trees per month", as depicted in Figure 8.

Figure 8. Carbon Footprint Result Example

Overall, the game incorporates animations and sounds to provide a more engaging and immersive experience for players.

3.2 Eco Rank

In EcoGolfer, each decision made by the player has an impact on the planet as well as the character's journey in the game. The game translates actions into the number of trees necessary to offset their environmental impact to make this connection easier for users to understand. The purpose of it is to educate players on sustainability, tying real-world environmental awareness into in-game choices.

Regarding the first scenario, while playing the game choices about how players travel long distances, whether by car, motorcycle, bus, train, or plane are tracked. Moreover, the game considers both the distance traveled and the mode of transportation, demonstrating to players better alternatives, such as electric cars or trains, that have a lower environmental impact than more polluting options, such as petrol cars or air travel. It also considers the frequency of travel and whether the participant is traveling alone or with others. Group travel and reduced travel frequency are rewarded by reducing the number of offsetting trees needed, reinforcing the value of planning and sharing journeys.

For the second scenario, focused on the on-course transportation, micro-decisions players make when moving around the training facilities have an impact on the final outcome. Opting for walking or clean electric transport reduces the environmental impact. In contrast, unnecessary or frequent use of fossil-fuel-powered vehicles results in more “trees” needed to counterbalance these actions.

The third scenario, focusing on waste and recycling, tracks player’s decisions about single-use bottles and waste generation. The impact of using plastic and glass bottles, along with general waste production, is translated into environmental costs. Furthermore, the decisions about consumption, like using reusable containers or minimizing unnecessary purchases, directly reduces the number of offsetting trees.

Finally, the fourth scenario highlights that sports equipment choices have environmental consequences too. The game tracks lost balls and replaced clubs, encouraging players to value responsible use by avoiding unnecessary replacements and prolonging the life of gear, to result into a lower number of required trees needed to be planted per month to balance their harm on the environment.

Figure 9. Eco Rank leaderboard

Then the user can compare the trees that are required to be planted for each of these scenarios compared to the rest of the users, as can be seen in Figure 9.