Badge 2: Digital Game Design

When you play a video game, you enjoy the end product of a many-step process. Game makers have to create every aspect of the game: the scenario, challenges, goals, characters, and every possible choice players could make. It's a complex and creative process that combines imagination and a strong understanding of computer programming and design.

Steps

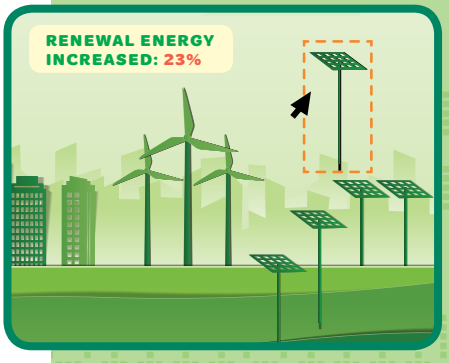
1. **Brainstorm game "for good" scenarios**
2. **Create a G.I.R.L. avatar for your game**
3. **Learn about decision trees in game design**
4. **Design your game**
5. **Playtest and iterate your game**

Purpose

When I've earned this badge, I'll know how video games use conditionals to give players choices and how video games can help people understand the world and its issues.

STEP

1 Brainstorm game "for good" scenarios



Can a video game change the world? Sure! Some games are just entertaining, but others build some aspect of positive change into their story or rewards. Games can teach people about important issues like poverty experienced in developing nations or the need for conservation of the environment. Games can also contribute to scientific research or help relief organizations raise money.

Game makers create the worlds that their characters inhabit. That means they create **scenarios** that include the setting, plot, and sequence of events. The scenarios reflect the **game mechanics**—or the rules and what the characters need to do to reach a goal.

What kind of scenario could you create for a game that promotes positive change? How could the goal of a game impact the setting, plot, or sequence of events? What kind of challenges could characters face and how can the challenges reflect the positive message you're trying to send?

WORDS TO KNOW

Avatar an electronic image that represents a person or character. Avatars can be manipulated by a computer user, like the player of a video game.

Condition a type of statement or test which will result in the condition being either true or false. They are used in the 'decision-making' part of an IF-ELSE statement.

Consequence in decision trees, a consequence refers to the result of a decision that has been made.

Decision tree a tool often used in the organization of many video games. It has a flowchart, or tree structure, that helps game developers design the structure and logic of the player's choices and consequences.

Game mechanics the instructions given to the computer on how the game is played. They're specific to the type of game: for example, in chess, all the moves relate to the game pieces. In video games, the rules of the world created by the game's designers are game mechanics. This can include how avatars move and how players beat a level.

IF-ELSE statement tests whether a condition is true and then runs one piece of code if the condition is true, or another if it's false. They're used by computers to make decisions. This is how the code looks in JavaScript:

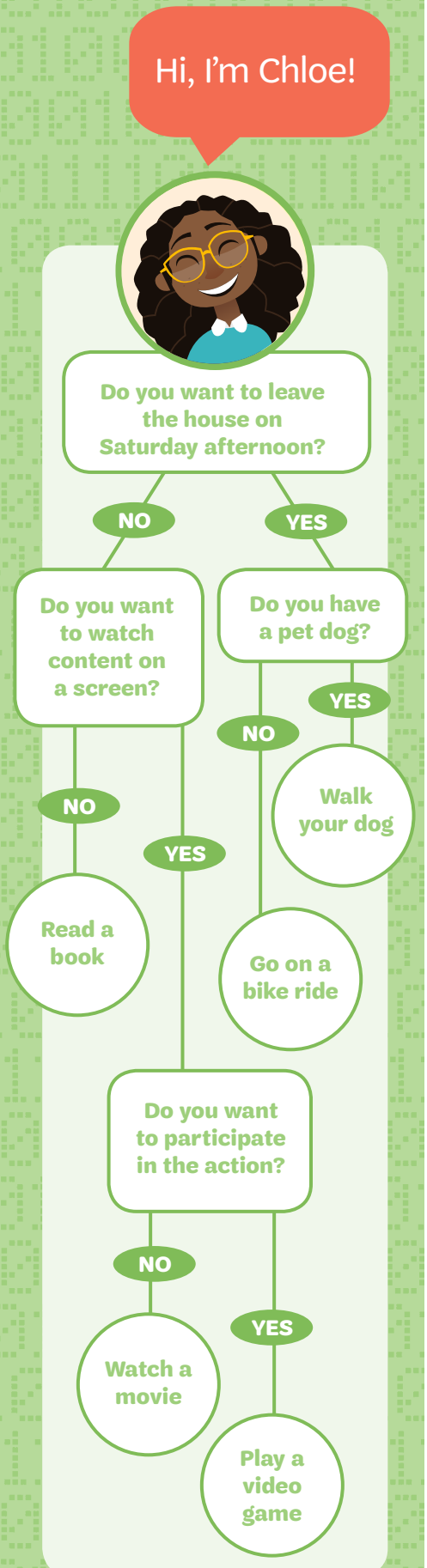
```
if (condition to be
        tested goes here) {
                this code runs if
                condition is true
} else {
        This code runs if
        condition is false
}
```

Narrative the story in a video game. It can have many different paths that are created by players making choices and facing consequences.

Node one element of a decision tree. This is the part of the decision tree where the question lives. The first node of the decision tree is called the **root node**. The nodes that come after the decisions are called **child nodes**. Nodes that don't have children are called **leaves** or **leaf nodes** (like with real trees, the leaves are at the end of the branches). In decision trees for game design, leaf nodes represent the end, or culmination, of one possible game. Trees can have multiple levels of child nodes and many leaves.

Playtest playing a newly developed game to test it for flaws and to identify possible improvements.

Scenarios the details of a situation, including the settings and sequences of events for a game, scene, or plot. It's part of the setup in many types of games.



STEP 2

Create a G.I.R.L. avatar for your game

Once you have a scenario for your game, you need a character to play in it. Game makers create each of the characters in their games. They might allow the players to customize their characters a bit by changing the way they look or choosing different traits to emphasize. The main personality of the characters, though, is usually determined by the game makers. They create characters by designing their look and sound, providing a back story, and creating the different situations where they makes choices.

What would a G.I.R.L. character be like? How could you show her G.I.R.L. qualities through your design choices?

G.I.R.L.

go-getter / innovator / risk-taker / leader

STEP 3

Learn about decision trees in game design

Every time you make a choice, you take a step down a certain path. Some choices are more important than others. Where you choose to go to college or work has more impact on your future path than what you eat for breakfast, but even breakfast choices have consequences.

Game makers design choices for players with **decision trees**. With every choice a character makes, the story changes and moves forward. Every choice has a **consequence**. That means that each decision causes some kind of result or effect. Games with decision trees let the players have some freedom to shape the story, making them fun to play.

To allow players to make choices in a game, programmers use **conditionals** in their program. They're the commands that let the computer understand decisions. A common conditional is the **IF-ELSE statement**. It tells the computer IF ___is true, do ___. ELSE (meaning if not), then do ___. For example, if the player clicks on the door, open the door and let the character walk through. Else, open the trap door in the floor and let the character fall through the floor below.

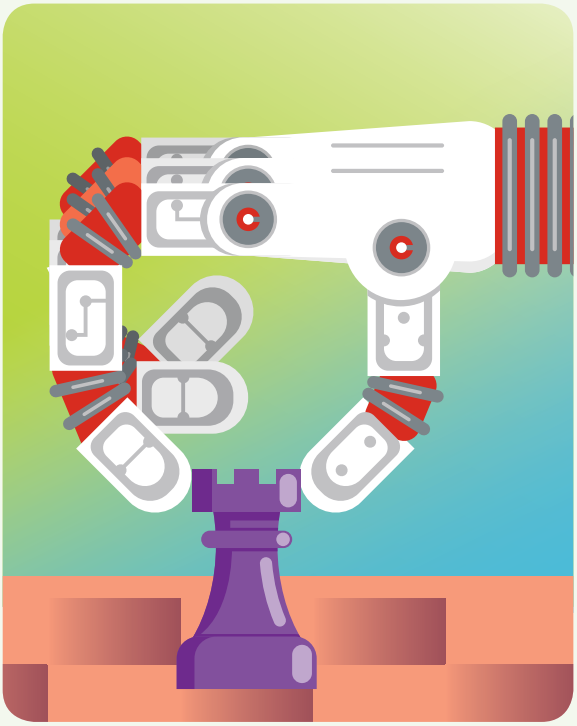
STEP

4 Design your game

What makes a game fun to play? When game makers design a story-based game, they start with a problem or challenge for characters to solve. They build their world around the problem, creating scenarios where their characters will make choices and face the consequences of their decisions. Each choice the player makes for her character will move the character and the story in a new direction.

The possibilities for choices that players can make are limited only by the programmer's imagination. The type of choices that make the game the most interesting are ones that are equally good or bad, or that have uncertain consequences.

AI and Game Design



It used to be that computers learning from experience was just something you'd see in movies like *2001: A Space Odyssey* or *WarGames*. But now AI is a real thing. Artificial intelligence, or AI, describes any machine that can assess its environment and take steps to achieve a goal. Computers that can understand human speech or self-driving ("autonomously operating") cars are examples of current AI technology. Video game makers are also starting to incorporate AI to make their video games more interesting.

For example, AlphaZero, a machine learning algorithm (or computer using AI), mastered three games: chess, Japanese chess, and Go. Starting with only the basic rules, AlphaZero played millions of games against itself and learned from its mistakes. Garry Kasparov, a chess expert or "master," commented that by discovering the principles of chess on its own, AlphaZero developed a style of play that "reflects the truth" about the game rather than "the priorities and prejudices of programmers."

Programmers wrote the algorithm that told AlphaZero how to play the games and how to learn from mistakes, but AlphaZero was then able to create its own style of play—it changed its algorithms based on what it had learned.

Playing For Peace

When most people think about video games, they imagine people fighting or blowing things up. There's a movement, though, to create games that teach and promote peace.

For example, students at Carnegie Mellon University created PeaceMaker, a simulation game about trying to resolve the Israeli-Palestinian conflict.

The United Nations' Economic and Social Council (UNESCO), has also created a competition challenging game makers to create games related to peace and sustainability.

In **World Rescue**, kids work together to solve global problems like disease, drought, or pollution.

In **Cantor's World,** adults learn how different government policy choices, like investing money or imposing regulations on businesses, affect the economy and sustainability. The choices players make have consequences for the environment and for people's well-being.

What other situations can you think of where you could create a game about peace or sustainability?

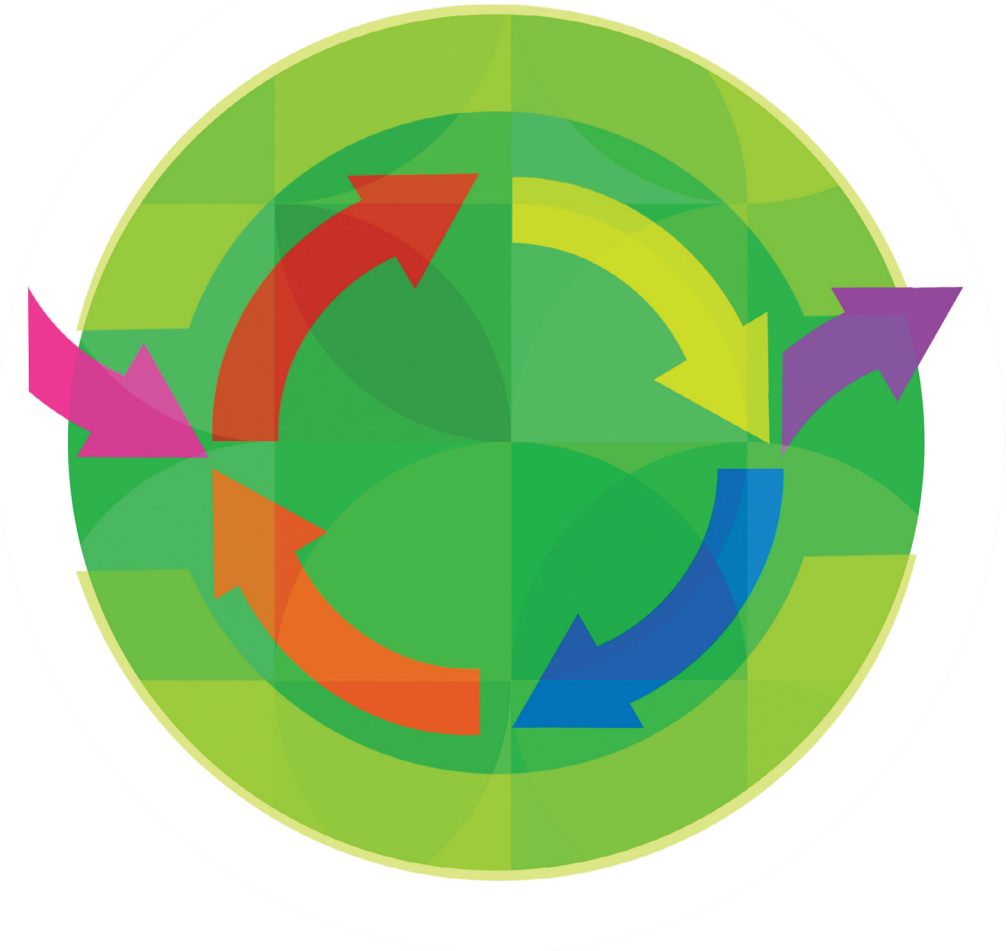
STEP 5

Playtest and iterate your game

In cooking, people sometimes say, "The proof is in the pudding." That means you only know how what you cooked tastes when you finally eat it. In video games, the proof is in the playing.

Game makers often have other programmers play their games and provide feedback during the development process to see if they work and are fun. They call this process **playtesting**. The game's developers then make changes based on the feedback. Each time they revise their game and have it playtested again is called an **iteration**.

This create, test, and revise process is used in all kinds of design, not just video game creation. Testing and iterating is an important part of good design because it lets you fix any problems, and possibly include better ideas than you had when you first started developing your creation.



Now that I've earned this badge, I can give service by:

- Inviting other people to play my game and sharing what I've learned about game design, conditionals, and open-ended stories.
- Starting a video gaming branch of my school's computer club that focuses on learning more about digital games and supporting each other.
- Researching the role of women in game design and creating a presentation, a video, or a social media post to share what I learned.

I'm inspired to: