Game Designing and Robotic Engineering Design Processes

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Introduction

Game Designer as a STEM Career

Do you like playing video games? Do you ever wonder how all those games are designed? Video games are not just about fun and entertainment, they are a complex blend of art, technology, and psychology. As primary school students, we have keen interests in video games. The idea that a game designer can turn their imagination into a whole new world is fascinating.

We have opted to focus on the STEM career of Game Designer and we'll show the similarities in how we have used the engineering version in VEX ourselves.

The engineering design process (EDP) is an iterative process involving a series of steps that engineers use to guide them as solving problems.

The game development process is a complex blend of creativity, technology, and collaboration. Utilizing the engineering design process (EDP) framework, game designer can break down this intricate workflow into manageable, yet interconnected, steps.

Engineering Design Process

How is this used by Game Design

We have searched a lot of videos and documents about game development process on the internet. With the help of my father, we had the opportunity to interview Uncle Damon, who is my father's friend and now works as a scene developer in a network game company.
He talked to us about the problems they may encounter in game development and how to deal with them. He used simple pictures to explain to us the general process of how a game goes from concept to development and release.

There are usually three directors in a standard game team: Creative Director, Technical Director, and Art Director.

The Creative Director has higher authority and decides which direction the game should be designed and produced. He makes the final decision on design disputes.

The Technical Director decides on the technical solutions to be adopted, develops the game's specific functions and systems, and ensures that the technical team is on the same page.

The Art Director is responsible for leading the production of the art resources needed for the game, ensuring the beauty and uniformity of the game's screen.
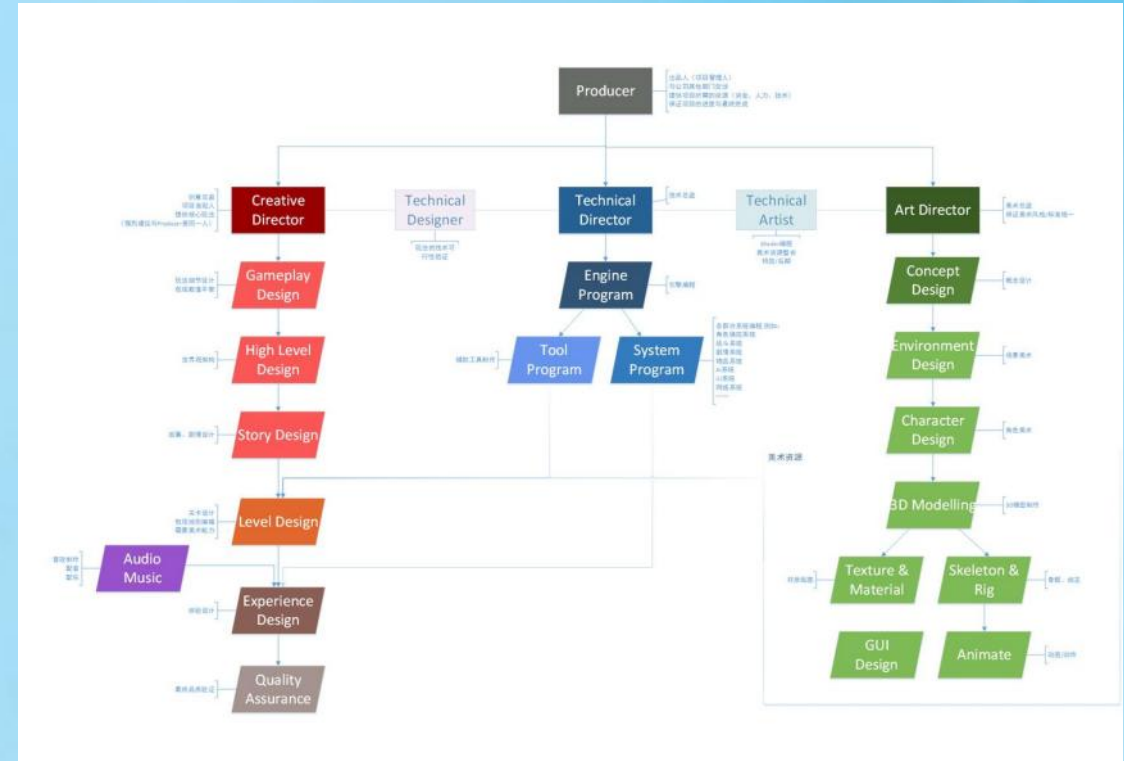
The EDP is a problem-solving framework that game designers use to turn their ideas into reality. It involves five key steps. Each step is crucial in bringing a game from concept to completion.

- First, the problem is identified. Game designers carefully consider what they want the game to be about and what challenges they may face during development. For example, they may decide that their game needs to have exciting puzzles or stunning visuals.

- Next comes brainstorming solutions. Here, designers generate many ideas on how to meet the identified problem. They could think of new characters, storylines, or unique features for the game. This step is all about creativity and coming up with as many ideas as possible.

- Then comes the important step of making design decisions. In this phase, designers narrow down their ideas and choose what will work best for their game. They may decide on a theme, choose colors for the graphics, and finalize other key elements.

- The next step is building prototypes. Prototypes are early versions of the game that allow designers to test their ideas and see how players react. This helps them identify any issues or problems early on and make necessary changes.

- Finally, there's evaluating and refining the design. After testing the prototype, designers analyze the feedback and see what works well and what needs improvement. They iterate on the design, making changes as needed until they are satisfied with the final product.

| 1. identifying the problem | → | 2. brainstorming solutions | → | 3. making design decisions | → | 4. building prototypes | → | 5. refining the design |

Figure 1. The Game Design Process

1. Ask: Identify the problem, requirements that must be met, and the constraints that must be considered.

2. Imagine: Brainstorm solutions and research what others have done in the past.

3. Plan: Select and sketch a design.

4. Create: Build a model or a prototype.

5. Test: Evaluate solutions by testing and collecting data.

6. Improve: Refine the design.

7. Share: Communicate and discuss the process and solutions as a group.

The engineering design process we have used when building and developing our robot is shown in Figure 2

Figure 2. Robotics Engineering Design Process

Similarities

Game Design VS VEX Robotics

Identify Problem | Ask

Before any designing can begin in both design processes, the problem must be identified and defined clearly.This is to ensure the game or robot created can meet all the requirements and work properly.
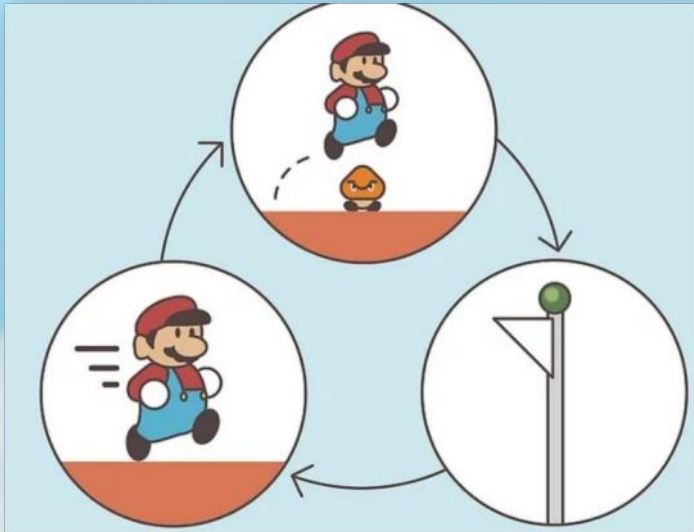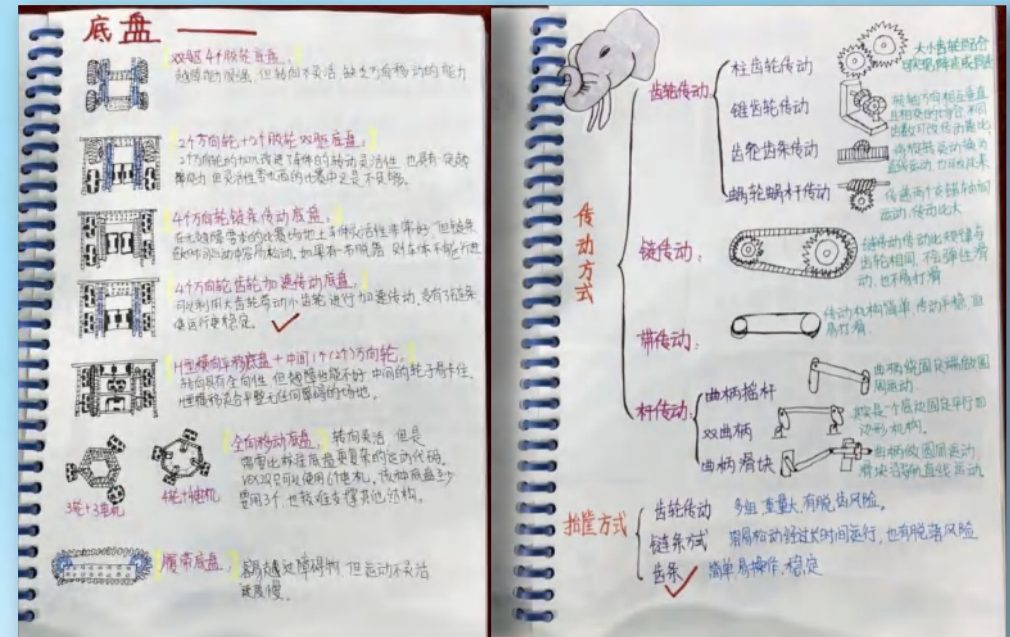

VS

Brainstorm | Imagine

In both processes, the next stages need to collect as much information as possible to ensure to make the best decision later. Designers generate many ideas on how to meet the identified problem. This step is all about creativity and coming up with as many ideas as possible.


VS

Making a Design | Select a Design | Build Prototype | Build Model

The next stage in both processes is to develop initial ideas further until a solution can be selected from which small scale models and prototypes can be built. It allows designers to test their ideas and see how players react. This helps them identify any issues or problems early on and make necessary changes.
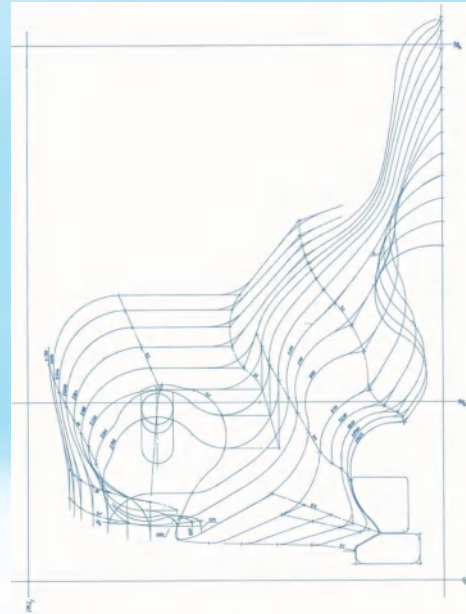
Making a Design | Select a Design | Build Prototype | Build Model
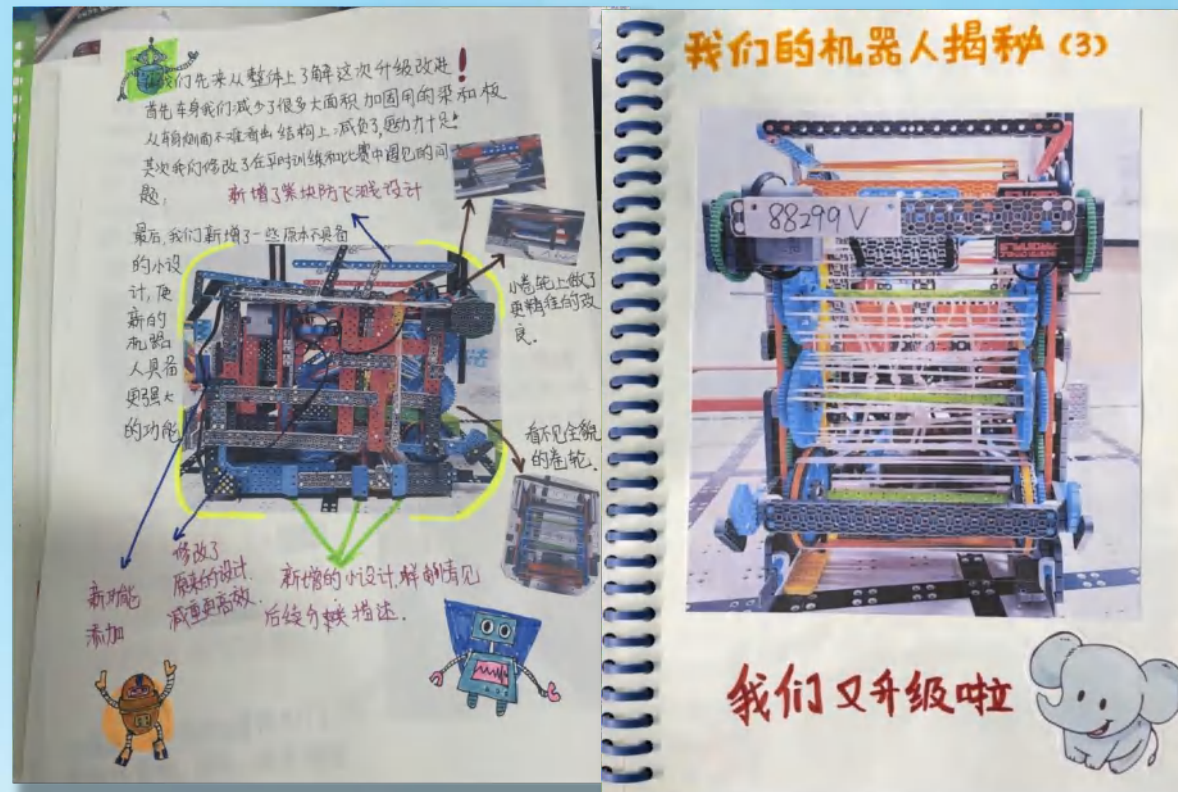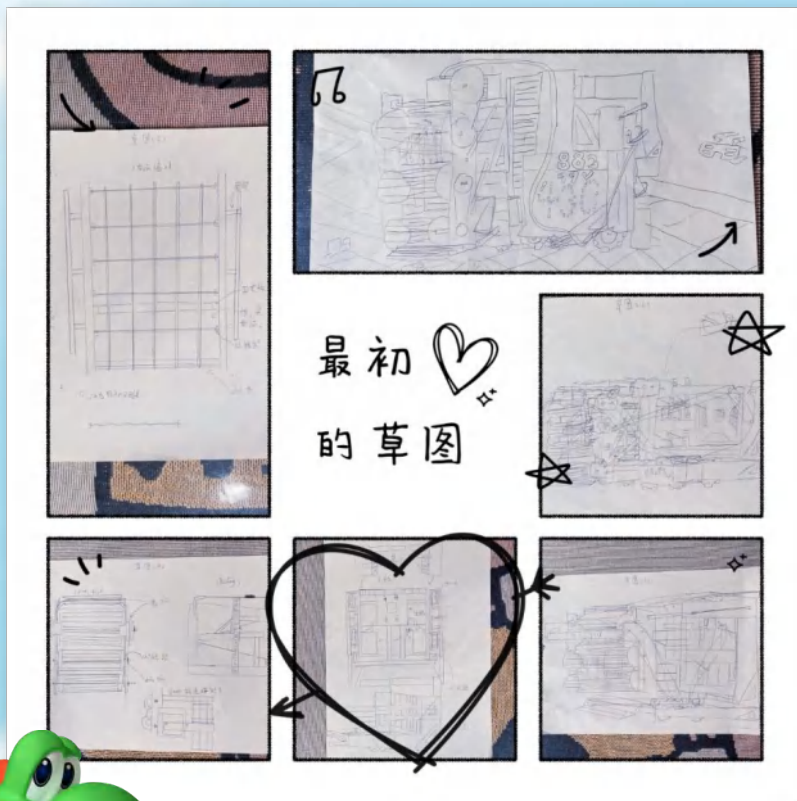
Refining the design | Test | Improve

Once prototypes and scaled models have been created, they are tested against the original requirements. After testing the prototype, designers analyze the feedback and see what works well and what needs improvement. They iterate on the design, making changes as needed until they are satisfied with the final product.

Next, maybe we can use our own designed VEX robots as prototypes to design a racing game. We can design the VEX race track as a complex, twisting, hilly 3D map, with purple and green energy blocks as the targets that need to be collected on the map. The red energy blocks placed in various positions need to be knocked over, and then at different designated locations, maybe a mini warehouse, maybe a mole hole, or other odd-shaped containers, pouring the collected energy blocks into them will get corresponding gold coin rewards. What a great idea it is! **WoW**, we are already using EDP to plan our first game. Does it sound awesome?

This is Team 88299V's Career Readiness about how a Game Designer uses the EDP.