DESIGN RESEARCH

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1. Introduction

After running several tests on the previous prototype, I have found several points that can be improved in the digital prototype. The following points are as follows:

- The goal of the game is still unclear.
- People have issues with thinking about the hard and soft side while playing.
- People have issues with thinking about the ideal world.
- People do not like watching videos constantly.

These are the biggest issues, most of which are a problem with the introduction phase. However, some of these are issues with the game itself.

To solve these, I want to set some design principles that I will use to set guidelines for any implementation of the solution.

1.1. Question

What game design principles can improve the current digital prototype?

2. Finding game design principles

Game design principles are everywhere. However, a lot of them involve things like narration, world design, and other things that do not apply to this project.

“Educational Video Game Design: A Review of the Literature” (Dondlinger, 2007) cites a variety of effective elements of video game design for educational games. One of these is motivation. While the research is inconclusive on whether this motivation is from the act of playing, or from the narrative context of games, they can agree on the fact that motivation is an important factor in effective game design. Motivation is defined as the combination of the desire to be competent and the pleasure of the activity.

Goed zijn in jezelf zijn.

Gamers themselves also have a lot of desires when it comes to usability to keep them engaged. Games also require an entirely different set of principles compared to other software products (Pinelle, Wong, & Stach, 2008). Using a set of 108 GameSpot reviews of a wide variety of games, a set of heuristics was created to gauge a game’s quality. Most of these are not applicable in this context. However, there are some that can be applied. These are “Unpredictable / inconsistent response to user’s actions,” “Does not provide enough information on game status,” and “Visual representations are difficult to interpret.” The others are perfectly viable as criteria for “regular” games (those made for entertainment purposes), but they do not fit this specific assignment.

Educational games also require different principles compared to regular games made for entertainment to motivate people. (Laine & Lindberg, 2020). They have developed a table of 56 motivational factors, divided into 14 classes. These are: Challenge, Competence, Competition, Control, Curiosity, Emotions, Fantasy, Feedback, Immersion, Novelty, Rules and Goals, Real World Relation, Social Interaction, and Usefulness.

However, motivators are an abstract concept. (Laine & Lindberg, 2020) proposes a variety of design principles that directly link to these motivators (and the classes mentioned above).

Before selecting any of these to take into development, I have set up the following criteria:

- Does the design principle address one of the issues mentioned in the Introduction chapter?
- Can an implementation of the design principle fit within the current prototype?
- Is the impact of an implementation testable?

2.1 Chosen design principles

Below is a table of the design principles I have chosen, taken directly from Laine & Lindberg, 2020, as well as from along with a short explanation as to why I chose them, and an example of an implementation that makes use of these design principles

Design Principle	Reasoning	Implementation Example
Raise curiosity by interesting and unpredictable challenges	While the game can't become too unpredictable, challenging users in unique ways to think about the ideal world or their hard and soft side could trigger them to know these better, alleviating one of the biggest issues people had with the game	Task players with creating the ideal world, using different words that apply to them.
Freedom of choice and control in gameplay	Allow players to tackle the game in the ways provided; starting with the soft side or the hard side, or allowing them to choose from different objects, words, or settings to create an ideal world	Allow players to pick with what side to start with Having freedom of choice in how to build the ideal world.
Create clear, meaningful, and achievable goals	Letting players know early what is expected of them, what the goal of the game is and what the hard and soft side are will alleviate confusion from players	Let people know what the result and end goal is through an example. Inform people on the hard and soft side, remind them of experiences to bring them into these mindset
Provide time to reflect amid intense game moments	Nothing about this game is very "intense," but this design principle describes giving the player a breather and allow them to reflect on what they just did. Allowing this in our game should allow the player to get in the correct mindset once again should they have strayed from it	Allow people a moment to reflect between the 2 rounds of the game. Provide players with a way to get into the opposite side

Provide the status of the game process and next available actions	Providing a clear overview of the next step will allow the player to expect what to do next	Use a clear “map” of steps that unlocks the following part when the one the player is currently on is complete
Relate to familiar activities	This will allow players to relate to experiences they’ve had before and use these experiences to either their ideal world, their hard side, or their soft side	Allow players to type things about the ideal world, or about experiences with their soft or hard side. Don’t save this data or do anything with it. Only use it as some sort of temporary notebook
Relate to past experiences	This will allow players to relate to experiences they’ve had before and use these experiences to either their ideal world, their hard side, or their soft side	Allow players to type things about the ideal world, or about experiences with their soft or hard side. Don’t save this data or do anything with it. Only use it as some sort of temporary notebook

3. Validation

While I may have my own reasoning for picking out these design principles, I am only one person. I need to validate these design principles.

3.1: Design principles in action

The best way to see if these design principles work, is to see them in action. What follows is another table, with each design principle along with one notable example of how these work in video games. I will take preference over games with educational content but will not strictly limit myself to games labelled as "educational games."

Design Principle	Example	Reasoning
Raise curiosity by interesting and unpredictable challenges	Turing Complete	Turing Complete is a computer simulator, allowing users to build things from simple logic gates solutions to functioning Turing Complete computers. Turing Complete constantly challenges the player by first having them build the logic gates they use for future puzzles. The game also has players validate their computer by providing programming challenges to run inside their computer. The game also has a variety of alternate ways to solve a solution and will congratulate the player if they can find these solutions.
Freedom of choice and control in gameplay	Rocksmith 2014/Rocksmith+	Rocksmith 2014 and Rocksmith+ are games that allow players to pick up a guitar and learn how to play. Any skill level can use this program. The game has a variety of modes that will let the player experience different parts of playing guitar.

		There's "Learn a Song" which has the player play along to a song as if it were guitar hero, with the notes flying in. "Guitarcade" has players play minigames to practice techniques like tremolo picking, scales, chords and harmonics and "Session mode" allows the player to play along with a virtual band of their choosing.
Create clear, meaningful, and achievable goals	Kerbal Space Program	Kerbal Space Program is an accurate simulation of spacecraft, allowing players to create rockets, satellites, and space shuttles to launch. Kerbal Space Program's campaign mode has very clear targets for you to set, starting with having you create a craft that can remain in orbit of the Kerbal home planet indefinitely. There are also several planets almost always in view which create long term goals to land on these planets. These will eventually also become available as missions.
Provide time to reflect amid intense game moments	Duolingo	Duolingo is the most popular language learning app, allowing users to learn how to speak, read and understand a wide variety of languages. After a lesson, Duolingo will allow you to reflect on how your lesson went. The game will show you the following stats: • Experience points gained.

		• Percentage of total questions correctly answered. • (Occasionally) The time it took to complete the lesson. The game will also provide you with a quick comment congratulating you on something you did well, allowing you to take a breather before moving on to the next lesson, even if it's only brief
Provide the status of the game process and next available actions	Turing Complete, Human Resource Machine	Turing Complete and Human Resource Machine both have a map featuring what levels the player has completed and which is next. Turing Complete's level map even features labels that will communicate to the player exactly what levels will cover what, from "Basic logic" to "CPU Architecture."
Relate to familiar activities	Human Resource Machine	Human Resource Machine is a game that teaches very simple programming through its own syntax and visualization. This unique visualization makes abstract programming concepts like variables and memory easy to understand by having these be blocks of numbers. The game also easily visualizes loops and jump commands by pointing arrows to where you're going, making these concepts that are generally

		difficult to understand for novices a bit easier.
Relate to past experiences	PC Building Simulator	PC Building Simulator is a game in which you run a company where you build PCs, the same way you would in real life. While the game does cater to those who have not built PCs by way of a “How to build a PC” menu and interactive tutorial, this game relates to the experience many gamers have had building PCs

Sources

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