Personal Portfolio 1 - Learning goal 2: Tower Defense Design Research & Design Document

# Introduction / Action plan

Firstly, I aim to spend 1 full day (8hrs) on research. Then, I want to design my ideas using the research within this document. After that, I’ll be ready to implement my ideas into the portfolio item, before finally doing the final portfolio item peer feedback and self-reflection.

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# PART 1: RESEARCH

## What am I going to research?

I’m going to do research on good design practices for games in the “tower defense” genre.

Specific points of interest:

* Tower design dos and don’ts
* Level design dos and don’ts
* Enemy design dos and don’ts

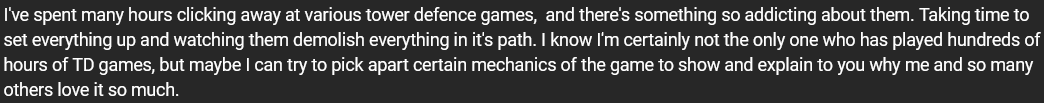
For this particular learning goal, I am not interested in a generic history lesson on tower defense games. I really want to invest my time into exploring some of the interesting design philosophy regarding tower defense games and zoom into some of the all-time greatest games in the genre to figure out which design aspects makes them so challenging, memorable, fun, and addicting. Then, I want to see if I can figure out how I can apply some of these things – on a very basic level – to my own simple tower defense game.

## Collecting research material

1. YouTube video: “What Makes Tower Defense Games Good?”

<https://www.youtube.com/watch?v=f6KTtb1r1lg&list=WL&index=1&t=639s>

* Channel seems to have a lot of videos on game design.
* Title is very relevant.
* Video description also shows relevance.



2. Article: “Why We Love Tower Defense”

<https://www.ign.com/articles/2012/09/24/why-we-love-tower-defense>

* IGN is a reputable source.
* Article analyses Orcs Must Die 2 which is an esteemed tower defense game.
* The article is a bit dated.

3. YouTube video series: “Game Design Principles - Tower Defense”

<https://www.youtube.com/watch?v=DL4tiI53IW4&list=PL-eCFrNZ9nlImCM7CdPpby8Ee2fVErVQO>

* Series has 5 episodes, it seems to be very in-depth.
* Videos are presentation-style and look well-prepared.
* The author is not a reputable as he has very little videos and a small website.

4. Article: “Optimizing Tower Defense for FOCUS and THINKING – Defender’s Quest”

<https://www.gamedeveloper.com/design/optimizing-tower-defense-for-focus-and-thinking---defender-s-quest>

* Reputable source, expansive website that features articles specifically for game developers.
* Defender’s quest (the analyzed game) is a well-received game.
* Dated article.

## Research

### 1. YouTube video: “What Makes Tower Defense Games Good?”

Takeaways:

* **DO**: Many tower defense games allow you to upgrade your towers. This is an important feature, because if the player is not able to spend their money on upgrading towers but only placing new towers, they will quickly run out of space.
* **DO**: A wide variety of (balanced) towers allows players to play their own way. The more variety there is, the more unique combinations the player can make, which means the way they overcome the challenges will feel unique to them and motivate them to try and overcome more of the game’s challenges in their own personal way.
* Another takeaway from this video on top of this point is that more towers is not the only way to increase variety. **Example:** You can also add different upgrade paths to towers or make it so that towers synergize with each other when placed near each other.
* **DO**: Enemy variety keeps things fresh by presenting new challenges to the player. This is because even if they can figure out a good defense strategy at one point, introducing new enemies that behave completely different from what the player is used to will force them to come out of their comfort zone and figure out new ways to defend.
* **Example**: Player loves using the fast attack speed arrow towers which are great against the normal enemy because of their high damage output. But now, suddenly a new enemy arrives: a very fast enemy with lower health. The fast-attacking arrow towers can’t kill this enemy because they are too fast. The player must now figure out how to deal with this new enemy and mix up the defense strategy that they’ve gotten used to. Maybe they must try out a new tower; one that will one-shot the slow enemies, one that will slow down the enemies, or perhaps try upgrading their arrow tower to be able to slow these fast enemies.
* **DON’T**: Introducing many towers all at once will overwhelm and confuse the player. Two possible solutions are: A) Introducing new towers with new levels. B) “ranking up” as you defeat more enemies, with higher ranks you will unlock new towers. Some games take this to the next level and make it so even the towers themselves will need to rank up before unlocking it’s upgrades.

### 2. Article: “Why We Love Tower Defense”

Takeaways:

* This article mainly goes into the psychology behind what drives us to play tower defense games, or “defend” something in general. However, it seems to be mainly based on the author’s own experience and assumptions.
* In many games, you go into enemy territory. You have to explore the unknown and face whichever challenges you come across. In the tower defense genre however, this is the other way around. You are fighting on home turf and must defend your own. This comes with the feeling of an urge to protect something. We don’t want to lose what’s ours, and we want to repel invaders; and in a way, these urges almost feel prehistoric.
* The author also draws a parallel between childing fort building and tower defense after mentioning the shared themes of security, ownership, and protection.

**From abovementioned points, I can draw some conclusions…**

* **DO:** Allow players to personalize and build their defences, reinforcing the idea that the in-game space is their own.
* **DO:** Incorporate familiar themes of security and protection. Design levels that evoke a sense of home turf, where players must defend against invaders, aligning with the instinct to repel threats.
* **DON’T:** Overlook the importance of player exploration. While the genre is about defence, ensure that the game provides opportunities for strategic exploration within the confines of the player’s territory.

### 3. YouTube video series: “Game Design Principles – Tower Defense”

#### Episode 1 takeaways:

* There are 4 key player motivation groups that are relevant to the tower defense genre.
  + Mastery and creativity
* The player must feel in control of their own playing field and be allowed to shape their own playstyle (freedom and playing room).
  + Progression and power
* The player must feel they are becoming stronger as the game progresses (power fantasy).
  + Complexity and puzzle
* The player must be allowed to figure out their own solution to the challenges and feel smart because of it (leave room for multiple solutions to the problem).
  + Elegance and aesthetics
* Elegant visuals enhances the feeling that all the pieces work together.
* **DO:** Combine tower design with player motivation theory.
* **Example**: High damage hits enhance player power fantasy. High AoE enables player to feel creative for placing it the correct way on the map. Armor piercing hits enables player to feel smart for correctly picking that tower.
* **DO?:** Allowing players to pick which enemies their tower focuses is adds a lot of depth to gameplay. It can also overcomplicate things, however. When adding it, try to make it a system which players can choose to engage with rather than being forced to micromanage their towers.
* Core game loop:

**A diagram of a plan

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* **DON’T:** Forget to add meaningful reasons for the player to sometimes save up resources. If they aren’t motivated to take risks, the game becomes less strategic for it and more “spam towers the moment you see you have enough money”.

#### Episode 2 takeaways:

* **DO:** Think about how the range and area of effect attacks of your towers interact with the shape of the level.
* **DO:** Towers with low uptime synergize with the player’s power fantasy motivation because they’re typically very high damage/lethality to balance out their low uptime.
* **DON’T:** Overcomplicate targeting and resistances to the point where you are basically saying to the player “haha your carefully thought out defense strategy actually doesn’t work because of THIS specific thing you were not prepared for”; this can be very frustrating.  
    
  Note: A lot of the systems that were discussed in this episode are outside of the scope of my project. I try to limit my DOs and DON’Ts to the scope of my project, but I still enjoy absorbing the information on the more in-depth design theory of tower defense.

#### Episode 3 takeaways:

* **DO:** Having multiple paths is a way to introduce more complexity and puzzles for the player.
* **DO:** Limiting tower spots forces the player to make strategic choices to prioritize one optimal tower placement over another.
* **Example:** Placing water in the maps doesn’t only make it look nicer, but it can also significantly limit the availability of spots where towers can be placed.
* **DO:** Overlapping paths can create “kill zones” (or kill boxes) which compliments the player’s power fantasy because hitting a lot of enemies at once feels very powerful.
* **DON’T:** Having multiple paths that are identical to one another does not add complexity to the level design. It merely tells the player to solve one puzzle and then implement it twice.
* **DO:** When introducing new towers or mechanics to players, provide them with a map that compliments this immediately and allows them to experiment with it.
* **DON’T:** Apply this to every level; this is BAD for creativity! But it still important to be able to teach the player important mechanics earlier on in the game.
* More room for a varied tower placement on maps breeds a high skill ceiling and a feeling of mastery.

#### Episode 4 takeaways:

* Player journey

A diagram of a journey

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* **DO:** Give the player positive feedback to show that their strategy has defended successfully; e.g. reward them with 3 stars if they did not lose any lives vs. 1 star if they had only a few lives left.
* Sometimes players need to fail to see that their strategy did not work. Designing the game in a way where they are able to see flaws in their defense is very important to this failure not making the player feel frustrated but rather making them feel clever the next time they do manage to succeed.
* This episode mentions a lot about enemy armor, which I would love to add in my game, but it is unfortunately not within the scope of the project.

A screenshot of a computer

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This is a chart that shows how certain stat increases respond to increase in damage per seconds. This is extremely useful for balancing costs vs. reward for towers.

From low to high:

1. Tower range. Increasing a tower’s range has extremely limited response to increase in DPS because of its high dependency on the level design.
2. Crit chance. Because monsters have limited HP, doing critical damage above the monsters HP loses a lot of that effective damage.
3. Damage per hit. Same as above but has a little better response because the number won’t be as big as the critical hits.
4. Area of effect. Increasing AoE has a great deal of effect on damage per second.
5. Attacks per second. AS almost has a linear effect on DPS because of it’s low waste of effective damage.

### 4. Article: “Optimizing Tower Defense for FOCUS and THINKING – Defender’s Quest”

* **DO:** Ensure that melee towers have clear advantages or unique abilities compared to ranged towers to encourage their use.
* **DO:** Offer detailed stats and information about each tower's abilities, damage, range, and special effects to aid player decision-making.
* If I want to add Area of effect attacks for certain towers, I have to ensure that the player is aware of exactly how much enemies this tower is able to hit. This can be done by either providing the player with the information preemptively, or through experimentation.
* This also applies to **enemy design.** Provide clear information about enemy stats, abilities, and weaknesses to help players make informed decisions.
* **DON’T:** Avoid having towers that are significantly more effective than others, leading to players exclusively using a single tower type.
* Mainly achieved through trial and error and testing during development.
* **DO:** Design levels that encourage thoughtful tower placement without overwhelming players with excessive map size or scrolling. Avoid overly intricate map designs that distract players from the core gameplay or create unnecessary confusion.
* “Less is more” approach.
* **DON’T:** Avoid enemies that have only one specific solution for defeat, limiting player creativity and strategic options.

# PART 2: DESIGN

## Tower design

Within the scope of my project, I can manage to design 3 towers (on top of my basic tower which is already in the game). I will introduce each of them separately to the player; one per level.

**Tower 1: Arrow Tower**

Tower stats:

Attack type: single target

Attack speed: Fast

Attack damage: Low

Attack range: Medium

Cost: Low

Tower description:

This tower is the most basic tower that will introduce the player to the game as well as always providing them with a reliable defense option in any other level.

**Tower 2: Mage tower**

Tower stats:

Attack type: All enemies within range

Attack speed: Medium

Attack damage: Medium

Attack range: Medium

Cost: Medium

Tower description:

This tower introduces the player to towers which can attack multiple enemies at once. They will now have to play close attention to ensure the tower’s placement is optimal.

**Tower 3: Sniper tower**

Tower stats:

Attack type: single target

Attack speed: Very slow

Attack damage: Very high

Attack range: Very high

Cost: High

Tower description:

This tower allows the player to not worry so much about range, at the cost of attack speed and a high investment. It will be very useful for dealing with fast enemies that have a lot of HP, but not good vs. crowds of enemies.

**Tower 4: Buff tower**

Tower stats:

Attack type: N/A

Attack speed: N/A

Attack damage: N/A

Attack range: Medium

Cost: Medium

Tower description:

This tower allows the player to buff the attack speed of other towers, but the tower can only be placed on water. It will be very useful for buffing mage towers or sniper towers, but the player must remember to place those close to water.

## Level Design

Within the scope of my project, I can manage to design 4 levels (on top of my basic level which is already in the game). The first 4 levels have the main goal to introduce the player to new towers/enemies, while the final 5th level is meant is a skill test.

**Level 1: Introduction**

A green square with a path

Description automatically generated

Level description: This is a very basic level to introduce the player to the game.

Level unlocks: Arrow tower

**Level 2: Mage tower**

A green square with a blue line

Description automatically generated

Level description: This is a basic level to introduce the player to the benefits of AoE

Level unlocks: Mage tower

**Level 3: Sniper tower**

A green and brown square with blue lines

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Level description: This level introduces the player to multiple enemy paths, as well as showing them the benefits of the sniper tower; it can hit both paths.

**Level 4: Inspiration tower**

A green square with blue lines

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Level description: This level introduces the player to a situation where they can’t place a lot of towers, so need to make clever use of the new “inspiration tower” to buff up their other towers.

**Level 5: Final test**

**A green and brown square with a path

Description automatically generated**

Level description: This is the final level of my small tower defense game, where the player must use all their gained knowledge to succeed.

## Enemy design

Within the scope of my project, I can manage to design 4 enemies next to the basic enemy that’s already in the game.

Note: In this design document I use keywords such as “High”, “Medium”, and “Low”. This is because the exact number might chance after testing/balancing, and I don’t want to have to go back to this document every time and change it.

**Basic enemy**

**A pixelated triangle with a red line above it

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Health: Medium

Speed: Medium

Effect: None

Reward: Medium

Damage: Low

Description: Basic “filler” enemy. This is the most common enemy.

**Fast enemy**

**A red triangle with black eyes and a red line above it

Description automatically generated**

Health: Low

Speed: Very Fast

Effect: Slows down when hit

Reward: Medium

Damage: Low

Description: Faster enemy. This enemy will try to sneak by the defenses, but slows down when it’s hit. This means it counters the mage and sniper tower, but is weak to the inspiration tower and arrow tower.

**Minion**

**A green triangle with a red stripe

Description automatically generated**

Health: Very low

Speed: Medium

Effect: None

Reward: Low

Damage: Low

Description: Very weak enemy that is meant to be spawned in crowds. It is countered by the mage tower, and strong vs. the sniper tower.

**Mother enemy**

**A purple triangle with a red line above it

Description automatically generated**

Health: High

Speed: Slow

Effect: Spawns minions on death

Reward: None

Damage: Medium

Description: Beefy enemy that will spawn minions on death. It counters the mage tower.

**Boss enemy**

**A blue and red pixelated cartoon

Description automatically generated**

Health: Very high

Speed: Very slow

Effect: None

Reward: N/A

Damage: Very high

Description: Super beefy enemy that is meant as a final test for the player before winning the level.