

# Raziq Research

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## Unreal Engine Documentation

The Unreal Engine documentation was essential in developing my turn based virtual reality game. Given that Unreal Engine is a complicated development platform, the documentation provided the aid I needed to understand its extensive toolset and utilize features effectively for my project.

The sections dedicated to Blueprint scripting were very helpful. They allowed me to design and refine turn-based mechanics, organize player actions, and integrate VR specific functionalities without relying on C++ programming. This improved the prototyping process for my turn-based system.

Virtual Reality development guides were useful for finding best practices for configuring motion controllers, managing input, and ensuring user comfort which are very important for VR. The documentation on the gameplay framework, including GameMode, PlayerController, and Pawn classes helped with understanding the architecture and my approach to implementing the turn based system.

## Unreal Engine Crash Courses

Many tutorials on Unreal Engine aided me in understanding how to start my development process. From lighting, to input controls, and flow logic with a turn-based structure. I was able to fully implement my own system after learning from these crash courses. Below are the used crash courses I found:

- <https://www.youtube.com/watch?v=k-zMkzmdugl&t=9832s>: Unreal Engine 5 Beginner Tutorial - UE5 Starter Course
- [https://www.youtube.com/watch?v=1XjgLKrb4\\_M](https://www.youtube.com/watch?v=1XjgLKrb4_M): How to Create a Game in Unreal Engine 5 - UE5 Beginner Tutorial
- [https://www.youtube.com/watch?v=6UIU\\_FsickK8](https://www.youtube.com/watch?v=6UIU_FsickK8): Unreal Engine 5 – Full Course for Beginners
- [https://www.youtube.com/watch?v=i3xNb5R\\_xos](https://www.youtube.com/watch?v=i3xNb5R_xos): Create Your First VR Project in Unreal Engine 5 | Meta Quest 3 | Quick Setup Guide for Beginners

- <https://www.youtube.com/watch?v=wqjJU4V6bGM>: VR with Unreal Engine 5 - Full Beginner Course
- <https://www.youtube.com/watch?v=u3yk75fUR-U>: VR with Unreal Engine 5 - Full Intermediate Course

Some of these tutorials are hours long, providing substantial amounts of information to aid me in my development process. Virtual reality being a difficult task to handle as a beginner in Unreal Engine added to the challenge which I also overcame through helpful tutorials. More specifically, the user interface was a daunting task. Tutorials involving user interface in VR proved very helpful in my journey towards creating the game. The tutorials used are:

- <https://www.youtube.com/watch?v=kM27HYbpvc0>: Build User Interfaces In VIRTUAL REALITY For Unreal Engine 5
- <https://www.youtube.com/watch?v=0q2ij542l90>: Creating a VR Menu in Unreal Engine 5
- <https://www.youtube.com/watch?v=iDb0VkWpPy8>: Understanding The VR Hand Menu In Unreal Engines 5's VR Template

## Pokemon System Formulas

### Battle Damage Formula

**Damage = (((((2 × Level) ÷ 5) + 2) × Power × (Attack ÷ Defense)) ÷ 50) + 2) × Modifier**

The calculation of damage from a move is based on several essential components. It takes the attacker's level and the move's base power as the foundation. The type of attack it is (physical or special) is also taken into account alongside the defender's type of defense. Modifiers are then applied, such as a STAB move which is a same type attack bonus and if the move is super effective against the creature or not.

### IVs and EVs

For stats other than HP:

**Stat = (((Base × 2) + IV + (EV ÷ 4)) × Level ÷ 100) + 5**

For HP:

**HP = (((Base × 2) + IV + (EV ÷ 4)) × Level ÷ 100) + Level + 10**

A pokemon's statistics are decided by base values, Individual Values (IVs), and Effort Values (EVs) which range from 0 to 31. IVs are a pokemon's inherent potential while EVs are points gained through training to enhance stats. Together with the species' base stats and the level, these factors decide performance in battles to ensure a unique and strategic training regimen.

## Catch Rate Formula

**Catch Value = (((3 × Maximum HP – 2 × Current HP) × Catch Rate × Ball Bonus) ÷ (3 × Maximum HP)) × Status Bonus**

When capturing a wild pokemon, several factors decide the chances of success. If the HP is low, chances are increased. Also, each creature has a specific catch rate reflecting its difficulty to capture. The type of ball used to catch the creature also affects the success rates.

## Typing Multipliers

**Super Effective = ×2 damage**

**Not Very Effective = ×0.5 damage**

**No Effect = ×0 damage**

**Dual types multiply these effects together (for example, a Water attack against a Fire/Ground Pokémon = ×4).**

**Same Type Attack Bonus (STAB) = ×1.5 damage if the move matches the user's type.**

The type system is a key mechanic in Pokemon. Each move has a specific type, and each pokemon can have one or two types. What a move is effective against an opposing type, it deals double damage. If it is ineffective, the damage is halved. For dual-type pokemon, these effects can result in significant weaknesses or resistances.

## Experience Formula

The experience system in Pokemon calculates the amount of EXP a pokemon earns after battle. This is influenced by the base yield of the defeated Pokemon, the level of the fainted pokemon, and the number of participants in battle.

The formula for calculating EXP is:

**EXP = (Base EXP \* Level of fainted creature) / 7**

The Base EXP is a fixed value associated with the defeated pokemon.

## Max Experience Formula

The Max experience formula calculates the total experience points needed for a pokemon to reach a specific level. The formula is:

**EXP = (4 \* LEVEL<sup>3</sup>) / 5**

This means the required EXP scales with the cube of the level.