

Game balancing practice

Previous compulsory steps / Prior students' knowledge	Game Balancing theory sequence
Learning objectives	Practicing about elements of game balancing.
Subjects	English as a foreign language, Economics, Psychology
Recommended Age (10 – 14) or (15 - 18)	All
Material needed	Video display, internet access
Sequence duration	60 minutes
Individual or group activity	Group activity
Expected production	Written assignment on balancing a game
Skills developed (after learning objectives)	Writing, Creativity

Step by step: how to implement the sequence

- **Step 1 Game balancing in practice (20 minutes)**

Show this video to your students (from 1:41 to 7:16):

<https://youtu.be/WXQzdXPTb2A?t=101>

- **Mathematical concepts**

- **Opportunity cost**

Show this video to your students:

[‘Opportunity cost’](#) by Investopedia.

Ask your students examples of opportunity costs in games. Orient it on immediate benefits and delayed benefits if they have no idea. For instance, performing a strong powerful attack with a slow animation that puts you in danger versus a fast and safe weak attack.

- **Relationships**

Ask your students how informative is the fact that a character inflicts 5 points of damage. → That tells you nothing unless you know how much damage enemies can take before they die. Now you have two numbers, Damage and Hit Points, and each only has meaning in relation to the other.

- **Identity and Linear Relationships**

- identity relationship is where two values change in exactly the same way. Add +1 to one value, it's equivalent to adding +1 to the other. For game balance purposes, you can treat the two values as identical. But it can make sense to have two different values that just happen to have a one-to-one conversion.

Ask your students examples in games of 2 resources having an identity relationship? → In a game where you can buy 1 unit of food for 1 unit of gold: food

and Gold have an identity relationship... although it is one-way in this case, since you can convert Gold to Food but not vice versa.

- linear relationship, the conversion rate between two values is a constant.

Ask your students examples in games of 2 resources having linear relationship?

→ If a healing spell always costs 5 MP and heals exactly 50 HP, then there is a 1-to-10 linear relationship between MP and HP.

• Exponential and Triangular Relationships

- Exponential

Suppose a player can pay resources to gain additional actions in a turn-based strategy game. One extra action might be a small boost, but three or four extra actions might be like taking a whole extra turn. Each extra action is more valuable than the last. You would therefore want the cost of each extra action to increase, as you buy more of them. In such cases, you need a numeric relationship that increases or decreases its rate of exchange as you exchange more or less at a time. The simplest way to do this is an *exponential* relationship: when you add to one value, multiply the other one. An example is doubling for each +1 you give to one value, *double* the other one. This gives you a relationship where buying 1, 2, 3, 4 or 5 of something costs 1, 2, 4, 8 or 16, respectively. As you can see, the numbers get really big, really fast when you do this.

- Triangular

If you want something that increases, but not as fast as an exponential. 1, 3, 6, 10, 15, 21, 28, ... In our earlier example, maybe the first extra action costs 1 resource; the next costs 2 (for a running total of 3), the next costs 3 (for a total of 6), and so on. The difference between the first two numbers (1 and 3) is 2. The difference between the

next two numbers (3 and 6) is 3. The next difference (between 6 and 10) is 4. So, the successive differences are *linear*: they follow the pattern 1, 2, 3, 4...

- **Step 2 — Analysing the statistics of a simple game (15 minutes)**

Let's suppose a game where you have four main stats: Hit Points (HP), Magic Points (MP), Attack and Defense. You are exploring game areas, and every few steps you get attacked by an enemy. You lose if your HP is ever reduced to zero.

The more defence you have, the less damage you take. The higher your attack, the faster you can defeat an enemy. There are healing spells that directly convert MP into HP. There are attack spells that do damage. There are buff/debuff spells that respectively increase the damage you deal or reduce the damage you take in a combat. There are teleport spells that take you across long distances.

Ask your students how all of these numbers are related, and how:

- Encounters and HP: each encounter reduces HP, or you can convert HP into encounters
- HP and Defense: by taking less damage, your HP lasts longer, increasing your Defense is equivalent to giving yourself a pile of extra HP
- HP and Attack: the faster you defeat an enemy, the fewer opportunity it has to attack you, so you take less damage. Thus, you can survive more fights with higher Attack.
- MP and HP: even though MPs are versatile, virtually all of the uses for it involve converting it (directly or indirectly) into HP – either by avoiding combat, or by increasing stats which are in turn related to HP.

Ask your students what can be said about the HP stat of this game, and what is the loss condition:

→ The loss condition for the game is put in the middle of everything! This is a common technique, making a single resource central to all of the others.

- **Step 3 — Written assignment (15 minutes)**

Show this video on the level design of celeste to your student to inspire them for the assignment: [‘Why Does Celeste Feel So Good to Play?’](#) by Game Maker’s Toolkit from 6:20 to 8:40, as well as [‘Level design of Celeste’](#) by Chariot Rider from 7:50.

Ask you students to find balancing elements that could be used in the game they are creating by picking among those presented in the sequence. They should figure out the statistics and resources the game uses as well as their relationships. If they can identify a “hub” or central resource, is it relevant to make it the win/lose condition of the game? If another resource should be the central resource, how could they change the relationships between resources to make it so?

They should also reflect on the capacities the main character should develop during the game, and how to enable the player to unlock new gameplay features. Each new ability should be the basis for creating counters. A counter can be an enemy or a piece of environment that blocks an ability or forces the player to learn a new way to use it. They should strive to avoid dominant strategies, and to keep the player in flow.

References

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