

**Instructor's Manual Materials to Accompany
FUNDAMENTALS OF GAME DESIGN, 2E**

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THIS INCLUDES MATERIALS FOR CHAPTERS 9-21

Instructor's Manual Materials to Accompany FUNDAMENTALS OF GAME DESIGN, 2E

CHAPTER 9 GAMEPLAY

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Understand the basic principles that a designer should follow to make games fun.
- Explain how the hierarchy of challenges requires players to complete atomic challenges, sub-missions, and missions to accomplish the ultimate goal of winning the game.
- List challenges commonly used in games, including physical coordination challenges, exploration challenges, conflict challenges, and economic challenges, among others.
- Define actions in the context of the game world and describe how actions are selected to allow a player to meet specific challenges or serve other functions in the game.
- Discuss the arguments in favor of and opposed to supplying a saving mechanism and explain the most widely used methods for saving a game.

CHAPTER OVERVIEW

This chapter discusses making games more fun. Although there isn't a secret formula for making a fun game, there are things to avoid that can sap the fun from any game. Errors and challenges that are too easy or too hard detract from any game. Review the long list of challenge types for help on creating and balancing the difficulty of the challenges. Allow players to save and reload the game as needed. Limiting saves does not create fun.

The major sections in this chapter are:

1. **Making Games Fun.** A high-quality game is more likely to be fun than a game filled with errors or broken features. Avoiding errors, tuning, and polishing are the most important things the development team can do.
2. **The Hierarchy of Challenges.** The player faces a hierarchy of challenges simultaneously, from completing the entire game as the overarching challenge, down to an atomic-level challenge that he must address at the current moment.
3. **Skill, Stress, and Absolute Difficulty.** The intrinsic skill required and the stress (time pressure) determine the absolute difficulty of a given challenge, relative to the trivial case of such a challenge.
4. **Commonly Used Challenges.** A variety of challenges are used in different games. This section lists them.

5. **Actions.** A small number of actions can be used to overcome a large number of challenges.
6. **Saving the Game.** Allow the player to save and reload the game at will.

CHAPTER OUTLINE

- I. Making Games Fun
 - A. Execution Matters More Than Innovation
 - B. Finding the Fun Factor
- II. The Hierarchy of Challenges
 - A. Informing the Player about Challenges
 - B. The Intermediate Challenges
 - C. Simultaneous Atomic Challenges
- III. Skill, Stress, and Absolute Difficulty
 - A. Intrinsic Skill
 - B. Stress
 - C. Absolute Difficulty
- IV. Commonly Used Challenges
 - A. Physical Coordination Challenges
 - B. Logic and Mathematical Challenges
 - C. Races and Time Pressure
 - D. Factual Knowledge Challenges
 - E. Memory Challenges
 - F. Pattern Recognition Challenges
 - G. Exploration Challenges
 - H. Conflict
 - I. Economic Challenges
 - J. Conceptual Reasoning and Lateral Thinking Puzzles
- V. Actions

- A. Actions for Gameplay
 - B. Defining Your Actions
 - C. Actions That Serve Other Functions
- VI. Saving the Game
- A. Reasons for Saving a Game
 - B. Consequences for Immersion and Storytelling
 - C. Ways of Saving a Game
 - D. To Save or Not to Save

KEY TERMS

absolute difficulty The difficulty of a challenge, taking into account both the *intrinsic skill required* and the *stress* on the player, as compared to the trivial case of a similar challenge.

atomic challenge A challenge that the player faces immediately during play. One of the lowest-level challenges in the *hierarchy of challenges*. A challenge that is not composed of other subchallenges.

conflict challenge A challenge requiring the direct opposition of forces under the player's control. Not to be confused with *conflict of interest*.

explicit challenge A challenge the player is explicitly told about by the game. Typically the explicit challenges are the *victory condition* and the *atomic challenges*.

gameplay The challenges presented to a player and the actions the player is permitted to take, both to overcome those challenges and to perform other enjoyable activities in the game world.

hierarchy of challenges A theoretical hierarchy of goals the player tries to achieve at any given moment, consisting (from the top down) of completing the entire game, winning the current level, completing a sub-mission within the level, if any, and so on down to the challenge immediately facing him at the moment, an *atomic challenge*.

implicit challenge A challenge the player is not told about directly but must infer from the rules, observation of the game, trial-and-error, or by knowing what the *explicit challenges* are.

intrinsic skill required The amount of skill a player must have to meet a challenge independently of time pressure, as compared to the trivial case of the same challenge. One component of *absolute difficulty*.

stress The time pressure placed on a player while she tries to complete a challenge. Stress is one element of the challenge's *absolute difficulty*.

TEACHING NOTES

I. Making Games Fun

A. Execution Matters More Than Innovation

Teaching Tips: Errors can ruin a good game. Ask students how frequently they have found bugs in game software. What did they do when they encountered the error?

B. Finding the Fun Factor

II. The Hierarchy of Challenges

Teaching Tips: In the hierarchy of challenges, atomic missions are the lowest level. Atomic missions → Sub-missions → Missions → Completing the game

A. Informing the Player about Challenges

Teaching Tips: To be motivated to continue playing, the player always needs a goal.

B. The Intermediate Challenges

Teaching Tips: Ask students to identify the explicit and implicit challenges in games they currently play.

C. Simultaneous Atomic Challenges

III. Skill, Stress, and Absolute Difficulty

A. Intrinsic Skill

Teaching Tips: Ask students to suggest how they would measure intrinsic skill in a variety of activities, independently of time pressure.

B. Stress

Teaching Tips: Ask students how stress can be increased without adding time pressure. For example, in a multiplayer game, stress is increased when other party members depend on your skill. Being the healer for a group can be stressful when the group is attacked. Time is involved because you must heal teammates before they take too much damage and die. Additional pressure is created by the risk of failing to save a teammate.

C. Absolute Difficulty

IV. Commonly Used Challenges

Teaching Tips: Rather than focusing on every challenge in this list, ask students to create a chart. The chart should include the type of challenge, the skill involved, and how to adjust the difficulty of the challenge.

A. Physical Coordination Challenges

B. Logic and Mathematical Challenges

- C. Races and Time Pressure
- D. Factual Knowledge Challenges
- E. Memory Challenges
- F. Pattern Recognition Challenges
- G. Exploration Challenges
- H. Conflict
- I. Economic Challenges
- J. Conceptual Reasoning and Lateral Thinking Puzzles

V. Actions

Teaching Tips: Actions produce consequences in the game world. Be sure students realize that actions are associated with input devices and the user interface. “Defeat the enemy” is not an action, but “throw a punch” is.

- A. Actions for Gameplay

Teaching Tips: A few actions can be used to overcome many challenges.

- B. Actions That Serve Other Functions

Teaching Tips: Some actions can exist just to provide entertainment.

VI. Saving the Game

- A. Reasons for Saving a Game
- B. Consequences for Immersion and Storytelling
- C. Ways of Saving a Game
- D. To Save or Not to Save

Teaching Tips: Permit the player to save the game whenever it’s possible.

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

How does saving affect a game?

Answers will vary. Students should consider increased entertainment from saving customizations made to the avatar and lowering the difficulty by giving the player the ability to “rewind” the game, removing an event.

Discussion Question 2

Ask students to identify the ratio of actions to challenges in the primary gameplay mode of a game they currently play.

Answers will vary. Most games have few actions to overcome numerous challenges.

II. Web Projects

Web Project 1

Go to http://www.gamasutra.com/features/20000707a/huntsman_03.htm. Read number 10 about saving games in the article “A Primer for the Design Process, Part 1: What to Do,” by Tim Huntsman. What happened in *Baldur's Gate—Tales of the Sword Coast* if you loaded a saved game? Is this fair to the player?

Answers will vary. Students should consider the pros and cons of saving a game.

Web Project 2

Go to <http://www.amazon.com>. Select a game you have not played from the games for sale. Based on the information displayed about the game, describe the challenges, actions, and victory condition you would expect to see in the game.

Answers will vary based on the game selected.

WEB RESOURCES

- http://www.gamasutra.com/features/20000707a/huntsman_03.htm—A Primer for the Design Process, Part 1: What to Do.

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CHAPTER 10 CORE MECHANICS

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Explain the functions of the core mechanics in a game.
- Describe the key components—resources, entities, attributes, and mechanics—that define how a game works.
- Explain how a game's internal economy controls the way resources and entities are produced, consumed, and exchanged by means of sources, drains, converters, and traders.
- Discuss how the core mechanics implement both challenges and player actions to manage gameplay.
- Know how to design the core mechanics of a game by writing specifications to document the entities and the functioning of the mechanics.
- Understand how to use random numbers in a game, and test with Monte Carlo simulation.

CHAPTER OVERVIEW

This chapter discusses the role of core mechanics in entertaining the player. Resources, entities, and mechanics specify precisely how the rules are applied. The core mechanics also govern the game's internal economy. It specifies when and how resources enter the game, transfer ownership, and exit the game. You can write the core mechanics by making your early design work more specific.

The major sections in this chapter are:

1. **What Are the Core Mechanics?** Core mechanics consist of the data and algorithms that precisely define the game's rules.
2. **Key Concepts.** Resources, entities, attributes, and mechanics define how your game works.
3. **The Internal Economy.** Resources enter the game, transfer ownership, and leave the game.
4. **Core Mechanics and Gameplay.** Core mechanics manage the gameplay by implementing player actions and challenges.
5. **Core Mechanics Design.** Identify the entities and mechanics and document their functions.

6. **Random Numbers and the Gaussian Curve.** Random numbers may be uniformly distributed or normally (non-uniformly) distributed, and designers need to use the appropriate kind for different situations.

CHAPTER OUTLINE

- I. What Are the Core Mechanics?
 - A. Turning Rules into Core Mechanics
 - B. Where Are the Core Mechanics?
 - C. The Core Mechanics as Processes
 - D. Functions of the Core Mechanics in Operation
 - E. Real-Time Games Versus Turn-Based Games
 - F. Core Mechanics and Level Design
- II. Key Concepts
 - A. Resources
 - B. Entities
 - C. Mechanics
 - D. Numeric and Symbolic Relationships
- III. The Internal Economy
 - A. Sources
 - B. Drains
 - C. Converters
 - D. Traders
 - E. Production Mechanisms
 - F. Tangible and Intangible Resources
 - G. Feedback Loops, Mutual Dependencies, and Deadlocks
 - H. Static and Dynamic Equilibrium
- IV. Core Mechanics and Gameplay
 - A. Challenges and the Core Mechanics

- B. Actions and the Core Mechanics
- V. Core Mechanics Design
 - A. Goals of Core Mechanics Design
 - B. Revisit Your Earlier Design Work
 - C. List Your Entities and Resources
 - D. Add the Mechanics
- VI. Random Numbers and the Gaussian Curve
 - A. Pseudo-Random Numbers
 - B. Monte Carlo Simulation
 - C. Uniform Distribution
 - D. Nonuniform Distribution
 - E. The Gaussian Curve

KEY TERMS

attributes Data values that describe one or more qualities of a character or unit. These may be symbolic, numeric, or collections of data. For descriptions of the various kinds of attributes, see *characterization attributes*, *status attributes*, *functional attributes*, and *cosmetic attributes*.

compound entity An entity made up of more than one datum. An entity describing the wind that included both speed and direction would be a compound entity consisting of two *attributes*, one for wind speed and one for direction.

converter A mechanic, sometimes automated, that converts one or more resources into one or more other resources.

deadlock A condition of the game's *internal economy* in which either (a) a *production mechanism* cannot begin to operate because it requires a *resource* that is not available and no means exists to produce the needed resource or (b) a production mechanism ceases to operate because it has run out of some needed input resource and no means exist to produce the needed resource. Deadlocks are caused by the presence of a *feedback loop* or a *mutual dependency* in the flow of resources.

drain A mechanic that permanently removes *resources* from the game world without introducing anything in exchange.

entity A datum or collection of data that describes some object, character, quantity, or state of affairs in the game. See *simple entity* and *compound entity*.

feedback loop In an *internal economy*, a situation in which some of the resource produced by a production mechanism must either (a) be used to initiate the production mechanism in the first place or (b) be fed back into the production mechanism to keep it operating. Feedback loops run the risk of creating a *deadlock*.

game engine That part of the game's software that implements the *core mechanics*.

global mechanic A mechanic that operates throughout the game regardless of which gameplay mode the game may be in.

internal economy That subset of the *core mechanics* that deals with the numeric relationships among entities in the game and the way those relationships change over time and in response to events in the game.

mutual dependency A condition of an *internal economy* in which two processes each require the output of the other as an input in order to function. If one of the input supplies is diverted elsewhere and no more becomes available, a *deadlock* will occur.

production mechanism A mechanic that either is a source of a resource or converts an unusable resource (such as buried gold) into a usable one.

resources Entities in the game world that may be created, destroyed, gained, lost, transferred from place to place or from player to player, or converted into other entities. Resources must be measured in numeric quantities. If an entity in a game never changes and cannot be traded, such as a hill in a war game, then the entity is not a resource.

simple entity An entity containing a single datum, such as a number or a symbolic value. The number of points a player has scored is a simple entity.

source A mechanic that introduces resources into the game world without requiring anything in exchange.

trader An on-demand mechanic, often implemented as an NPC, that exchanges resources with the players and NPCs for other resources. A trader does not create or destroy resources but changes their ownership.

unique entity An entity describing an object, character, or datum of which there is only one example in the game world.

TEACHING NOTES

Teaching Tips: Bring the rules for the *Monopoly* board game to class. (See Web Resources for the Hasbro Web address containing the Monopoly rules.)

I. What Are the Core Mechanics?

A. Turning Rules into Core Mechanics

Teaching Tips: Read one of the general rules in the *Monopoly* game. Note the language used in the rule.

B. Where Are the Core Mechanics?

C. The Core Mechanics as Processes

Teaching Tips: The game engine and storytelling engines do the work, as instructed by the core mechanics.

D. Functions of the Core Mechanics in Operation

E. Real-Time Games Versus Turn-Based Games

Teaching Tips: Turn-based games, such as *Monopoly*, are more sequential. The mechanics operate in between player turns.

F. Core Mechanics and Level Design

Teaching Tips: Core mechanics concentrate on features used in multiple levels of the game.

II. Key Concepts

A. Resources

Teaching Tips: Ask students to identify the resources in *Monopoly*.

B. Entities

Teaching Tips: Ask students to identify the entities in *Monopoly*.

C. Mechanics

Teaching Tips: Select a *Monopoly* rule. Ask students to identify the information needed for the core mechanics.

D. Numeric and Symbolic Relationships

III. The Internal Economy

A. Sources

Teaching Tips: Ask students to identify the sources in *Monopoly*.

B. Drains

Teaching Tips: Ask students to identify the drains in *Monopoly*.

C. Converters

D. Traders

Teaching Tips: Ask students to identify the trader in *Monopoly*.

E. Production Mechanisms

Teaching Tips: Ask students to identify the production mechanism in *Monopoly*.

F. Tangible and Intangible Resources

Teaching Tips: Ask students to identify the tangible resources in *Monopoly*.

G. Feedback Loops, Mutual Dependencies, and Deadlocks

Teaching Tips: Ask students how the deadlock is broken in *Monopoly*.

H. Static and Dynamic Equilibrium

IV. Core Mechanics and Gameplay

A. Challenges and the Core Mechanics

B. Actions and the Core Mechanics

V. Core Mechanics Design

A. Goals of Core Mechanics Design

Teaching Tips: Ask students how the Chance and Community Chest cards provide entertainment in *Monopoly*.

B. Revisit Your Earlier Design Work

Teaching Tips: Ask students to identify the bulleted items for *Monopoly*.

C. List Your Entities and Resources

Teaching Tips: Ask students to identify the bulleted items for *Monopoly*.

D. Add the Mechanics

Teaching Tips: Ask students to identify the resources, entities, challenges, and global mechanics for *Monopoly*.

VI. Random Numbers and the Gaussian Curve

A. Pseudo-Random Numbers

B. Monte Carlo Simulation

Teaching Tips: The chapter proposes Monte Carlo simulation as a means of testing the credibility of an algorithm for artificially generating the results of sports matches. Can students think of other algorithms they might test? Answers will vary, but might include combat models for real-time strategy games and role-playing games, and AI for simulated poker (or other gambling game) players.

C. Uniform Distribution

Teaching Tips: Roll one six-sided die 20 times. Track the results.

D. Nonuniform Distribution

Teaching Tips: Roll two six-sided die 20 times. Add the results of each roll. Track the results.

E. The Gaussian Curve

Teaching Tips: Have students suggest some game phenomena that they might like to conform to a Gaussian curve. Answers will vary, but might include the distance a batter hits a baseball, degree of variation from the ideal line in a car racing game, amount of damage done by a weapon in a fighting game, and other partially-random phenomena.

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

How important is it for a game designer to have some programming knowledge?

Answers will vary. Some programming knowledge will improve your ability to create core mechanics.

Discussion Question 2

Ask students to identify the best methods of generating random numbers in a variety of games.

Answers will vary. Students should consider the purpose of the random number in each game.

II. Web Projects

Web Project 1

Go to [http://www.hasbro.com/common/instruct/Monopoly_\(2003\).PDF](http://www.hasbro.com/common/instruct/Monopoly_(2003).PDF). Convert several rules into core mechanics.

Answers will vary based on the rules selected.

Web Project 2

Go to <http://www.hasbro.com>. Select the rules for another game. Convert several rules into core mechanics.

Answers will vary based on the game selected.

WEB RESOURCES

- [http://www.hasbro.com/common/instruct/Monopoly_\(2003\).PDF](http://www.hasbro.com/common/instruct/Monopoly_(2003).PDF)—*Monopoly* rules at Hasbro's Web site.

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CHAPTER 11 GAME BALANCING

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- List qualities that characterize a balanced game.
- Define a dominant strategy and discuss ways to avoid dominant strategies in both player-versus-player and player-versus-environment games.
- Know how to use the element of chance in a game so that player skill still ultimately determines the outcome of the game.
- List strategies for making both symmetric and asymmetric player-versus-player games fair.
- List strategies for making player-versus-environment games fair.
- Understand types of difficulty and explain ways to manage difficulty to maximize the player's enjoyment of the game.
- Discuss the phenomenon of positive feedback and discuss ways to control positive feedback in the game.
- Recognize qualities of unbalanced games such as stagnation and triviality and explain how they can be avoided.
- List design methods that can make fine-tuning easier.

CHAPTER OVERVIEW

This chapter discusses developing games that the players feel are fair. Good design eliminates dominant strategies and rewards the player for his skill. The difficulty level can be manipulated to offer the player challenges that meet his increased ability as he gains experience with the game and as the game provides him with more power.

The major sections in this chapter are:

1. **What Is a Balanced Game?** A balanced game is fair to the players, has the right amount of difficulty, offers meaningful choices, and uses the player's skills.
2. **Avoiding Dominant Strategies.** A dominant strategy is one that is always the best to use, which denies the player a meaningful choice.

3. **Incorporating the Element of Chance.** The player's skill must be more important than chance in the outcome.
4. **Making PvP Games Fair.** Balancing asymmetric games is difficult and requires extra testing.
5. **Making PvE Games Fair.** Review the list of qualities to include or avoid in designing PvE games.
6. **Managing Difficulty.** Designers should strive to balance the difficulty level of the game with the player's abilities.
7. **Understanding Positive Feedback.** The player's achievement makes it easier to achieve more.
8. **Other Balance Considerations.** Avoid stagnation and triviality.
9. **Design to Make Tuning Easy.** Tune your game to improve its balance and remove problems such as dominant strategies or difficulty spikes.

CHAPTER OUTLINE

- I. What Is a Balanced Game?
- II. Avoiding Dominant Strategies
 - A. Dominant Strategies in Video Games
 - B. Dominant Strategies in PvE Games
- III. Incorporating the Element of Chance
- IV. Making PvP Games Fair
 - A. Balancing Games with Symmetry
 - B. Balancing Asymmetric Games
 - C. Balance Issues for Persistent Worlds
- V. Making PvE Games Fair
- VI. Managing Difficulty
 - A. Factors Outside the Designer's Control
 - B. Types of Difficulty
 - C. Creating a Difficulty Progression
 - D. Establishing Difficulty Modes
- VII. Understanding Positive Feedback

- A. Benefits of Positive Feedback
 - B. Controlling Positive Feedback
 - C. Positive Feedback in Action
- VIII. Other Balance Considerations
- A. Avoiding Stagnation
 - B. Avoiding Trivialities
- IX. Design to Make Tuning Easy

KEY TERMS

absolute difficulty The difficulty of a challenge, taking into account both the *intrinsic skill required* and the *stress* on the player, as compared to the trivial case of a similar challenge. See also *relative difficulty* and *perceived difficulty*.

balance In a player-versus-player game, the design task of making the game fair to all players. In a player-versus-environment game, the design task of managing the difficulty level of the game.

dominant strategy A *strategy* so effective that the player has no reason to use any other strategy. A game containing a dominant strategy is said to be poorly *balanced*.

fair (1) In a player-versus-player game, a perception on the part of the players that they all have an equal chance of winning the game when it begins and that the rules do not create advantages for one player over another other than by the operation of chance. (2) In a player-versus-environment game, a set of player expectations about the nature of the game experience.

in-game experience Experience the player has gained from confronting a particular type of challenge during the course of a game. A factor in computing the *perceived difficulty* of a challenge at a given point in the game.

native talent The inherent ability that a player brings to a game.

perceived difficulty The player's actual perception of how hard a challenge is to overcome. It takes into account four factors: *intrinsic skill required*, *stress*, *power provided* by the game, and the player's *in-game experience* at surmounting similar challenges.

positive feedback A phenomenon of the game's *balance* such that successful player action makes subsequent challenges easier.

power provided The resources, actions, capabilities, and other game features under the player's control that enable him to meet challenges.

previous experience The amount of time the player has spent playing games similar to the one under development. This factor influences the *perceived difficulty* of the game but lies outside the designer's knowledge or control.

PvE Short for player-versus-environment. A type of game in which the player seeks to overcome challenges provided by the game's environment but does not directly compete with or oppose other players. Most single-player nonnetworked games are PvE games.

PvP Short for player-versus-player. A type of game in which multiple players compete to see who will be the winner or, in a *persistent world*, who will prevail in a particular conflict between players. In a single-player PvP game, the sole human player plays against an artificial opponent simulated by the computer.

relative difficulty A measure of the difficulty of a challenge relative to the *power provided* by the game to meet the challenge. Relative difficulty is computed from the *absolute difficulty* of the challenge and the power provided.

shadow costs Secondary or hidden costs that lie behind the apparent costs of goods or services.

strategy A plan or approach for playing and winning a game.

upgrade A change to gameplay that gives the player an advantage or capability he did not formerly possess. It usually occurs in one of two forms: as an improvement in the performance of his avatar or units or as a new action that was not previously available. The term is typically used in RPGs and strategy games; in action games it is more commonly called a *powerup*.

TEACHING NOTES

Teaching Tips: If possible, bring a game of Fox and Geese to class. Ask a small group of students to play the game.

I. What Is a Balanced Game?

Teaching Tips: Ask students to identify a few current PvP and PvE games. Are they balanced?

II. Avoiding Dominant Strategies

Teaching Tips: Ask students to identify a few examples of dominant strategies. How could the game be changed to eliminate the strategy?

A. Dominant Strategies in Video Games

B. Dominant Strategies in PvE Games

III. Incorporating the Element of Chance

Teaching Tips: Ask students if any game relies solely on chance.

IV. Making PvP Games Fair

A. Balancing Games with Symmetry

B. Balancing Asymmetric Games

Teaching Tips: Ask students if the Fox and Geese game played earlier seemed fair.

C. Balance Issues for Persistent Worlds

V. Making PvE Games Fair

VI. Managing Difficulty

A. Factors Outside the Designer's Control

Teaching Tips: These factors are native talent and prior experience.

B. Types of Difficulty

C. Creating a Difficulty Progression

Teaching Tips: Emphasize that the progression must not have spikes in it.

D. Establishing Difficulty Modes

VII. Understanding Positive Feedback

Teaching Tips: Which side in Fox and Geese gets the benefit of positive feedback?

A. Benefits of Positive Feedback

B. Controlling Positive Feedback

C. Positive Feedback in Action

VIII. Other Balance Considerations

A. Avoiding Stagnation

B. Avoiding Trivialities

Teaching Tips: Ask students for examples of trivialities in games they have played.

IX. Design to Make Tuning Easy

Teaching Tips: Separate code from data so you can modify parameters without recompiling the code.

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

What separates the difficulty levels for a game students currently play?

Answers will vary. Some students might suggest manual control of some features and more enemies in the harder levels.

Discussion Question 2

If any programmers are in the class, ask them for additional suggestions that will make it easier to tune a game in the future.

Answers will vary. Students should consider the components that can be grouped and components that should be kept separate.

II. Web Projects

Web Project 1

Go to <http://www.civfanatics.com/civ4/info/#Victory>. Identify the difficulty levels available in *Civilization IV*. Explain why so many difficulty levels are provided.

Settler, Chieftain, Warlord, Noble, Prince, Monarch, Emperor, Immortal, and Deity are the available difficulty levels. Answers about the reason for the number of levels should consider the complexity of the game.

Web Project 2

Go to http://www.gamasutra.com/view/feature/3355/postmortem_thief_the_dark_project.php. This is part of an article by Tom Leonard on the *Gamasutra* Web site. Review the fourth item, *Objectives and difficulty*. Why did this method of setting the difficulty levels work in this game?

Answers will vary. Students should consider the advantages identified in the article and the suggestions in the textbook for tuning a game.

WEB RESOURCES

- <http://www.sirlin.net/archive/rock-paper-scissors>—Sirlin, David. 2000. “Rock, Paper, and Scissors in Strategy Games” (referenced June 2, 2006).
- <http://www.osv.org/FoxGeese>—Fox and Geese playable online game.

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CHAPTER 12 GENERAL PRINCIPLES OF LEVEL DESIGN

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Understand how level design can enhance or undermine a game's story and gameplay.
- Know the difference between universal and genre-specific level design principles.
- List the possible level layouts and understand when to use each and how to combine them.
- Understand the importance of atmosphere, pacing, and progression.
- Describe the key aspects of the level design process.
- Recognize some of the pitfalls of level design, such as inappropriate scope and conceptual non sequiturs.

CHAPTER OVERVIEW

This chapter discusses level design, which is an iterative process that takes place during the elaboration stage of game design. Universal level design principles and principles that target specific genres are provided. Atmosphere, pacing, and tutorial levels are important design issues. Also, the layout of the space can affect the player's perception of the game and the experience. As you step through the level design process, avoid the classic errors.

The major sections in this chapter are:

1. **What Is Level Design?** Level design is the process of constructing the experience that will be offered directly to the player, using components provided by the game designer.
2. **Key Design Principles.** Universal level design principles are aimed at designing levels in any kind of game; genre-specific level design principles are focused on design issues specific to the different genres.
3. **Layouts.** Because layout of the space significantly affects the player's perception of the experience, a few common patterns are described.
4. **Expanding on the Principles of Level Design.** Atmosphere, pacing, and tutorial levels are particularly important design issues.

5. **The Level Design Process.** Level design is an iterative process that takes place during the elaboration stage of game design.
6. **Pitfalls of Level Design.** Avoid the classic level design errors.

CHAPTER OUTLINE

- I. What Is Level Design?
- II. Key Design Principles
 - A. Universal Level Design Principles
 - B. Genre-Specific Level Design Principles
- III. Layouts
 - A. Open Layouts
 - B. Linear Layouts
 - C. Parallel Layouts
 - D. Ring Layouts
 - E. Network Layouts
 - F. Hub-and-Spoke Layouts
 - G. Combinations of Layouts
- IV. Expanding on the Principles of Level Design
 - A. Atmosphere
 - B. Progression and Pacing
 - C. Tutorial Levels
- V. The Level Design Process
 - A. A Note on Duties and Terminology
 - B. Design to Level Design Handoff
 - C. Planning Phase
 - D. Prototyping
 - E. Level Review
 - F. Level Refinement and Lock-Down

- G. Level Design to Art Handoff
 - H. First Art and Rigging Pass
 - I. Art to Level Design Handoff and Review
 - J. Content Integration
 - K. Bug Fixing
 - L. User Testing and Tuning
- VI. Pitfalls of Level Design
- A. Get the Scope Right
 - B. Avoid Conceptual Non Sequiturs
 - C. Make Atypical Levels Optional
 - D. Don't Show the Player Everything at Once
 - E. Never Lose Sight of Your Audience

KEY TERMS

pace The rate at which the player is obliged to interact with the game; the speed at which the game presents challenges.

rigging The process part of level design that involves deciding where key events will take place in that level and what will trigger their occurrence.

scope The magnitude and complexity of the level, both in terms of the number of objects and characters that it contains and the special events that it includes.

tutorial level A *level* whose purpose is to teach the player about the *user interface* and the game's *atomic challenges* and its actions.

TEACHING NOTES

- I. What Is Level Design?

Teaching Tips: Quick review question: What components does the game designer give to the level designer?

- II. Key Design Principles

Teaching Tips: Ask students to provide concrete examples of the universal and genre-specific level design principles

- A. Universal Level Design Principles
- B. Genre-Specific Level Design Principles

III. Layouts

Teaching Tips: Assign students to small groups. Ask each group to draw an example of one layout type. Limit the time allowed to 10 or 15 minutes. Ask each group to present its layout.

- A. Open Layouts
- B. Linear Layouts
- C. Parallel Layouts
- D. Ring Layouts
- E. Network Layouts
- F. Hub-and-Spoke Layouts
- G. Combinations of Layouts

IV. Expanding on the Principles of Level Design

- A. Atmosphere

Teaching Tips: Select a setting. Ask students to fill in the components to create the right atmosphere.

- B. Progression and Pacing
- C. Tutorial Levels

Teaching Tips: Ask students to name particularly good or bad tutorial levels they have experienced in games.

V. The Level Design Process

Teaching Tips: Create a flowchart as you step through each part of the process.

- A. A Note on Duties and Terminology
- B. Design to Level Design Handoff
- C. Planning Phase
- D. Prototyping
- E. Level Review

- F. Level Refinement and Lock-Down
 - G. Level Design to Art Handoff
 - H. First Art and Rigging Pass
 - I. Art to Level Design Handoff and Review
 - J. Content Integration
 - K. Bug Fixing
 - L. User Testing and Tuning
- VI. Pitfalls of Level Design
- A. Get the Scope Right
 - B. Avoid Conceptual Non Sequiturs
 - C. Make Atypical Levels Optional
 - D. Don't Show the Player Everything at Once
 - E. Never Lose Sight of Your Audience

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

Why would designers have trouble agreeing on which design principles, if any, are universal?

Answers will vary. Some students might consider the vast differences among hardware, genres, and specific games within genres.

Discussion Question 2

Use the flowchart created during class of the level design process. Are there any steps that seem unnecessary or steps that should be added?

Answers will vary. Students should consider the importance of all the steps.

II. Web Projects

Web Project 1

Go to <http://www.finitearts.com/400P/400project.htm>. Download the 400 Project file. Evaluate two guidelines in the spreadsheet.

Answers will vary based on the selected guideline. Students should consider how the guidelines affect their design work.

Web Project 2

Go to <http://www.amazon.com>. View the computer game section. Select a game. Write two or three pages describing the components you would assemble to create an atmosphere for the game.

Answers will vary. Students should consider the story and the packaging.

WEB RESOURCES

- <http://www.finitearts.com/400P/400project.htm>—Barwood, Hal, and Noah Falstein. “The 400 Project” (referenced April 20, 2006).
- http://www.cgt.auc.ca/ppt/ld_pi.zip—Knowles, Rick, and Joseph Ganetakos. 2004. Level Design. Lecture delivered at the Computer Game Technology Conference, Toronto, Ontario, April 2004 (referenced June 14, 2006).

Instructor's Manual Materials to Accompany FUNDAMENTALS OF GAME DESIGN, 2E

CHAPTER 13 ACTION GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Identify the qualities that set action games apart from other genres.
- Recognize the distinct subgenres of action games and their particular features.
- Use the characteristic features of action games, such as levels, lives, and powerups, to design games of your own.
- Know the design limitations imposed by placing the player under time pressure.

CHAPTER OVERVIEW

This chapter discusses action games. Subgenres include a wide variety of action games such as fast puzzle games and dancing games. On the cutting edge of hardware, action games require fast reactions and rhythm.

The major sections in this chapter are:

1. **What Are Action Games?** In an action game, the majority of the challenges are physical.
2. **Action Game Subgenres.** Many types of games are action games, including fast puzzle games and dancing games.
3. **Game Features.** Action games have features and limitations based on the characteristics of the genre.

CHAPTER OUTLINE

- I. What Are Action Games?
- II. Action Game Subgenres
 - A. Shooters
 - B. Platform Games

- C. Fighting Games
 - D. Fast Puzzle Games
 - E. Action-Adventures
 - F. Music, Dance and Rhythm Games
 - G. Other Action Games
- III. Game Features
- A. Progression
 - B. Challenges
 - C. Player Actions
 - D. Core Mechanics Features
 - E. Victory Conditions
 - F. Interaction Model
 - G. Camera Models
 - H. User Interface

KEY TERMS

action game A game whose gameplay consists primarily of physical coordination challenges.

boss A large and particularly difficult challenge that must be overcome, typically the last one required in order to complete a *level* of a game.

checkpoints Locations in a game level at which the game may be saved or at which the avatar will be reincarnated if he dies.

collectible A game world object that is in the player's interest to find and collect.

combo move A rapid sequence of joystick movements and button presses that must be performed perfectly to produce an avatar action. Usually found in fighting games.

continuous scrolling A characteristic of scrolling 2D *camera models* where the landscape scrolls continuously in one direction; the player is unable to change it but has to deal with whatever appears.

first-person shooter (FPS) A *shooter* game in which the game world is displayed from the *first-person perspective*. Also sometimes called a POV (point of view) shooter and, in Europe, an egoshooter.

level exit In a game that involves exploration, the standard transition point from the current *level* to the next.

level warp In a game that involves exploration, a transition point other than the standard level exit that enables the player to jump to the next level (or even several levels ahead) without completing the current level.

mini-map A small, dynamically updated map of a *game world*, usually displayed in the corner of the screen in the *primary gameplay mode*, for quick reference. Also sometimes called a radar screen.

monster generator A device visible in the environment that serves as a *source* for enemies entering the game world. A monster generator may be destroyed or otherwise prevented from introducing enemies; contrast with *spawn point*.

parallax scrolling A display technique in which background objects in 2D environments scroll by more slowly than foreground objects, creating the impression that they are farther away. Normally used in the *side-scrolling perspective* to create an illusion of depth.

platformers Action or action-adventure games in which a common avatar action involves jumping on and off platforms in the game world.

powerup An object in the game world that, when found by a character (usually the avatar), gives that character added powers.

shooter A subgenre of action games whose primary challenge is shooting.

side-scrolling perspective A *camera model* normally used with *avatar-based interaction models* in which the game's *virtual camera* follows the *avatar* through a 2D *game world* presented in a side view.

spawn point A location in the game world where enemies appear (which means it is also a *source*). Sometimes also used to refer to locations where the avatar reappears after dying, typically in multiplayer first-person shooter games. The player normally cannot interfere with the operation of a spawn point and often the spawn point is visually indistinguishable from the rest of the environment.

teleporter A mechanic, often implemented in the game world as a visible object, that instantaneously transports a character from one place in the world to another.

top-scrolling perspective A *camera model* in which the *virtual camera* displays the 2D *game world* from directly overhead and the world scrolls by from the top to the bottom of the screen at a constant rate; most often used in *avatar-based gameplay modes* involving vehicles.

twitch game A game whose primary challenges are physical, concentrating chiefly on reaction-time tests.

variable scrolling A characteristic of 2D scrolling perspectives in which the landscape scrolls under, or behind, the avatar in response to his movements. Contrast with *continuous scrolling*.

wildcard enemy In an action game, an enemy that attacks the player at unpredictable times, outside the ordinary waves of enemies.

TEACHING NOTES

I. What Are Action Games?

II. Action Game Subgenres

Teaching Tips: Ask students if they are surprised by any of the subgenres or action game descriptions. If they only thought of shooters as action games in the past, some of the subgenres could be surprising.

- A. Shooters
- B. Platform Games
- C. Fighting Games
- D. Fast Puzzle Games
- E. Action-Adventures
- F. Music, Dance and Rhythm Games
- G. Other Action Games

III. Game Features

Teaching Tips: Bring several samples of a variety of action games. If possible, give small groups of students 10–15 minutes to play the sample games, calling out examples of the game features identified in the chapter.

- A. Progression
- B. Challenges
- C. Player Actions
- D. Core Mechanics Features
- E. Victory Conditions
- F. Interaction Model
- G. Camera Models
- H. User Interface

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

Why is a firefighter using a hose to put out fires considered to be a shooter game?

Answers will vary. Students should consider the use of a ranged weapon (hose) to target fires. Aiming and shooting (water) are actions common to action games.

Discussion Question 2

What other activity could be transformed into a shooter game?

Answers will vary. Students should consider activities that require aiming and hitting a target.

II. Web Projects

Web Project 1

Go to <http://www.yahoo.com>. Go to the Games area. Play *Bejeweled 2* in action mode. Describe the characteristics that make *Bejeweled 2* an action game.

Answers will vary. Students should consider the characteristics of the fast puzzle game.

Web Project 2

Go to <http://www.yahoo.com>. Play another action game. Describe the characteristics that make it an action game and the characteristics that differentiate it from *Bejeweled 2*.

Answers will vary based on the game selected. Students should consider the characteristics of an action game.

WEB RESOURCES

- <http://www.theesa.com/>—Entertainment Software Association. 2005. “2005 Essential Facts about the Computer and Video Game Industry.”

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CHAPTER 14 STRATEGY GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the definition of a strategy game and be familiar with the types of challenges that strategy games offer.
- Define the set of orders that a strategy player will be able to give in your game.
- Design a balanced set of units for use in a war game, including defining the attributes that govern their behavior.
- Compute the relative values of offensive and defensive units.
- Understand Lanchester's laws and how they affect the relative strengths of forces of different size.
- Create a technology tree of upgrades for the units that you have designed.
- Choose a system of logistics for your game and design the mechanism by which it works.
- Know the most common types of artificial opponents and their strengths and weaknesses.

CHAPTER OVERVIEW

This chapter discusses the characteristics of strategy games and the issues involved in creating a good strategy game. Most computerized strategy games are much more representational than abstract. This translates into complex core mechanics. The core mechanics usually consist of a rich internal economy focused on production of additional units. Because the number of available actions can be high, it is important to make the user interface as clear and well organized as possible.

The major sections in this chapter are:

1. **What Are Strategy Games?** Strategy games present strategic conflict challenges that are overcome by superior planning.
2. **Game Features.** Most computerized strategy games are representational war games with complex core mechanics.
3. **Core Mechanics.** Internal economy, which focuses on production, can be very complicated.

4. **The Game World.** Setting influences weapons, but gameplay is similar regardless of setting.
5. **The Presentation Layer.** Core mechanics can be complicated, so try to present information and commands in a clear, well-organized fashion.
6. **Artificial Opponents.** Hierarchical finite state machines are the most successful mechanism for artificial intelligence in a war game.

CHAPTER OUTLINE

- I. What Are Strategy Games?
- II. Game Features
 - A. Challenges
 - B. Player Actions
- III. Core Mechanics
 - A. Designing Units
 - B. Health, Morale, and Fighting Efficiency
 - C. Upgrades and Technology Trees
 - D. Logistics
- IV. The Game World
 - A. Historical Settings
 - B. Modern Settings
 - C. Future (Science Fiction) Settings
 - D. Fantasy Settings
- V. The Presentation Layer
 - A. Interaction Model
 - B. Camera Model
 - C. User Interface
- VI. Artificial Opponents
 - A. Game Tree Search
 - B. Neural Nets

- C. Hierarchical Finite State Machines
- D. A Final Note on Artificial Opponents

KEY TERMS

factories Entities, usually characterized as buildings, under player control that convert or produce resources of use to the player.

fog of war (1) The technique of hiding unexplored regions of a terrain from the player using an aerial perspective by showing them as featureless, usually black. (2) The technique of hiding regions or some aspects of terrain, even if previously explored, from a player using an aerial perspective, if the player has no *units* in the region to see what is going on there. Typically used in war games to prevent the player from observing enemy troop movements unless he has units nearby to see them.

game tree A hypothetical specification of all possible future events in a game, which can be drawn on paper in a diagram that looks like a tree, as future choices branch out. Normally used only for two-player turn-based games.

influence map A map maintained internally by the game software that records how a building in the game world landscape influences the area around it. Used to simplify logistics by having units in the neighborhood of the building receive support automatically.

permanent upgrade An upgrade to the capabilities of the player's avatar or units that lasts for the remainder of the game.

technology tree A diagram that represents the available sequences in which a player may upgrade his units in a strategy game by means of research. The diagram is tree-shaped because at intervals it branches, allowing the player to choose one particular sequence or another.

temporary upgrade An upgrade in the capabilities of a player's avatar or units that lasts for less time than the remainder of the game—either until the end of the current level, until a fixed number of real-time seconds have elapsed, or until some resource has been consumed.

unit In a strategy game, a combatant or support entity (such as a transport vehicle) under the control of one of the players.

TEACHING NOTES

- I. What Are Strategy Games?
- II. Game Features
 - A. Challenges

Teaching Tips: Note that strategy games use conflict challenges, but this doesn't always imply actual combat. The *Civilization* series of games can be won in a variety of ways.

B. Player Actions

III. Core Mechanics

Teaching Tips: The core mechanics of strategy games can be extremely complex, especially as units usually require AI for obeying the player's orders. Be careful not to overburden students.

A. Designing Units

B. Health, Morale, and Fighting Efficiency

C. Upgrades and Technology Trees

D. Logistics

Teaching Tips: Note that war games usually simplify or ignore logistics.

IV. The Game World

Teaching Tips: Create a chart comparing the settings.

A. Historical Settings

B. Modern Settings

C. Future (Science Fiction) Settings

D. Fantasy Settings

V. The Presentation Layer

A. Interaction Model

B. Camera Model

C. User Interface

VI. Artificial Opponents

A. Game Tree Search

B. Neural Nets

C. Hierarchical Finite State Machines

D. A Final Note on Artificial Opponents

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

In player-centric design, the player is the key to good design. Ask students to profile the strategic game player.

Answers will vary. Students should consider that players are detail-oriented planners.

Discussion Question 2

Why do players enjoy strategy games?

Answers will vary. Students should consider that some players enjoy outsmarting the opponent.

II. Web Projects

Web Project 1

Go to http://www.gamespot.com/gamespot/features/all/real_time. Read the article “A History of Real-Time Strategy Games” by Bruce Geryk. Use the information in the article to describe the development of real-time strategy games.

Answers will vary, but students should use the information in the article to track the development of real-time strategy games.

Web Project 2

Go to <http://www.usgo.org/resources/downloads/originsofgo.pdf>. Read the document “The Game of Go: Speculations on its Origins and Symbolism in Ancient China” by Peter Shotwell. Describe the history of Go, one of the earliest strategy games recorded.

Answers will describe the history of the Go game.

WEB RESOURCES

- http://www.gamasutra.com/features/20040806/adams_01.shtml—Adams, Ernest. 2004. “Kicking Butt by the Numbers.” Designer’s Notebook column on the *Gamasutra* Web site (referenced May 13, 2006).

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CHAPTER 15 ROLE-PLAYING GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the definition of role-playing games and the game mechanics common to them.
- Understand the history and evolution of role-playing games from tabletop to computer.
- Design character attributes for a role-playing game.
- Define a world and setting suitable for a role-playing game.
- Understand the use of experience points and character level for this genre.
- Know the different gameplay modes within this genre.

CHAPTER OVERVIEW

This chapter discusses the characteristics of role-playing games and the elements of creating a good computer role-playing game. Develop episodes that complete a major quest. Although computer role-playing games developed from tabletop games, they hide the core mechanics to aid the player's immersion.

The major sections in this chapter are:

1. **What Are Role-Playing Games?** The essential parts of a computer role-playing game are the quest or story of the game and character growth.
2. **Game Features.** The player progresses through several episodes, overcoming a major challenge at the end of each episode.
3. **Core Mechanics.** Complex character attributes enable characters to use magic or technology and learn skills.
4. **The Game World and Story.** Settings tend to be science fiction and fantasy.
5. **The Presentation Layer.** Hide the core mechanics.

CHAPTER OUTLINE

- I. What Are Role-Playing Games?
 - A. War Games
 - B. Action Games
 - C. Adventure Games
- II. Game Features
 - A. Themes
 - B. Progression
 - C. Gameplay Modes
- III. Core Mechanics
 - A. Rolling Dice
 - B. Character Attributes
 - C. Magic and Its Equivalents
 - D. Skills and Special Capabilities
 - E. Character Design
- IV. The Game World and Story
 - A. Settings
 - B. Story
- VII. The Presentation Layer
 - A. Interaction Model
 - B. Camera Model
 - C. User Interface

KEY TERMS

character level A numeric *status attribute* that roughly describes a character's power to perform certain activities. In role-playing games, characters rise from level to level with experience.

CRPG Acronym for computer role-playing game, used to distinguish it from noncomputerized tabletop role-playing games.

experience points A resource earned by the player through combat and other activities in a *role-playing game*.

leveling up or **leveling** In a game that implements *character levels*, the attainment of some accomplishment (usually arriving at a threshold number of *experience points*) that causes the character to gain a level and with it an increase in *characterization attributes*.

mana An expendable resource of magical power consumed by casting magic spells. The word is of Polynesian origin, although in that context its meaning is considerably more complex.

party A group of characters, normally under the control of one or more players, who act cooperatively in a game, most commonly a role-playing game.

role-playing game A game in which the player controls one or more characters, typically designed by the player, and guides them through a series of quests. Character growth in power and abilities is usually, but not necessarily, a key feature of the genre.

side quest A quest or mission, usually found in a role-playing game, that the player is free to accept or reject without his decision's affecting the progress of the main storyline.

skill tree A diagram showing the sequence by which a player may add new skills to his avatar or the characters in his party in a role-playing game.

TEACHING NOTES

I. What Are Role-Playing Games?

Teaching Tips: Role-playing games are beginning to take on features of some other genres.

- A. War Games
- B. Action Games
- C. Adventure Games

II. Game Features

- A. Themes

Teaching Tips: Select a theme for a sample role-playing game.

- B. Progression
- C. Gameplay Modes

Teaching Tips: Identify gameplay modes for the sample role-playing game. Common modes include exploration/combat, conversation, trading, and inventory management.

III. Core Mechanics

Teaching Tips: Like strategy games, role-playing games tend to have very complex mechanics. Be careful not to overburden students.

- A. Rolling Dice
- B. Character Attributes
- C. Magic and Its Equivalents
- D. Skills and Special Capabilities
- E. Character Design

Teaching Tips: A common part of role-playing is creating a character's history. Ask students to create a history for a character in a role-playing game for the selected theme. Fill in information about the character as you go through each topic in this section.

IV. The Game World and Story

Teaching Tips: Describe the settings for the sample role-playing game.

- A. Settings
- B. Story

Teaching Tips: Ask students to think of overall quests *other* than “save the world” or similar clichés.

V. The Presentation Layer

Teaching Tips: Describe the presentation layer for the sample role-playing game.

- A. Interaction Model
- B. Camera Model
- C. User Interface

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

In player-centric design, the player is the key to good design. Ask students to profile the role-playing game player.

Answers will vary. Students should consider that the settings are frequently fantasy or science fiction.

Discussion Question 2

When players create the history for their characters in a role-playing game, most create a tragic background that they blurt out to every character they meet. Why is this unrealistic?

Answers will vary. Students should consider that most people in real life do not walk up to complete strangers to share tragic tales of their childhood.

II. Web Projects

Web Project 1

Go to <http://entertainment.howstuffworks.com/larp.htm>. Read the article “How LARP Works” by Tracy V. Wilson. Use the information in the article to describe how live-action role-playing works.

Answers will vary, but students should use the information in the article to describe live-action role-playing games.

Web Project 2

Go to <http://pc.gamespy.com/articles/721/721114p1.html>. Read the article “State of the Game: *Star Wars Galaxies*” by Allen ‘Delsyn’ Rausch. Describe the history of the *Star Wars Galaxies* role-playing game. What problems has the game faced?

Answers will vary, but students should use the information in the article to describe the changes and problems faced by the *Star Wars Galaxies* game.

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CHAPTER 16 SPORTS GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the definition of athletic sports games and be familiar with the types of challenges that these types of sports games offer.
- Understand the challenges of meeting players' expectations about a real-world game in a video game implementation.
- Know the basics of adapting a physical sports game mechanic to a virtual world.
- Understand the design complexities for physics, AI, and player skill ratings required for a sports game.
- Use flowcharting to help define AI states within a sports game.
- Know the issues involved in licensing sports organizations, teams, and players, including the use of names and images.
- Understand mapping known physical game play mechanics to computer-human interface devices.

CHAPTER OVERVIEW

This chapter discusses the characteristics of sports games. Sports games enable players to experience a sport from the athlete's, coach's, or general manager's point of view. Acquire licenses to use information about real players, teams, and leagues. The physics engine uses the player data to create the gameplay.

The major sections in this chapter are:

1. **What Are Sports Games?** Sports games simulate real and imaginary sports.
2. **Game Features.** A sports game reproduces a match in varying degrees of accuracy.
3. **Core Mechanics.** Rating the athletes is a complex task that provides the data for the physics engine in the game.
4. **The Game World.** Licensing is required to use player, team, and league data.
5. **The Presentation Layer.** All the athletes' actions must be mapped to controllers.

CHAPTER OUTLINE

- I. What Are Sports Games?
- II. Game Features
 - A. Game Structure
 - B. Player Roles
 - C. Gameplay and Rules
 - D. Competition Modes
 - E. Victory and Loss Conditions
 - F. Opportunities for Creative Play
 - G. Miscellaneous Issues
- III. Core Mechanics
 - A. Physics for Sports Games
 - B. Rating the Athletes
 - C. Athlete AI Design
 - D. Injuries
 - E. Arcade Mode Versus Simulation Mode
 - F. Simulating Matches Automatically
 - G. Home-Field Advantage
- IV. The Game World
 - A. Licenses, Trademarks, and Publicity Rights
 - B. Audio Commentary
- V. The Presentation Layer
 - A. Interaction Model
 - B. Camera Models
 - C. User Interface Design

KEY TERMS

None

TEACHING NOTES

Teaching Tips: Select a sport familiar to most students.

I. What Are Sports Games?

II. Game Features

A. Game Structure

B. Player Roles

Teaching Tips: Identify the player's role in a computerized version of the selected sport.

C. Gameplay and Rules

Teaching Tips: Identify rules to be relaxed in your sample game.

D. Competition Modes

Teaching Tips: List the competition modes to be included in your sample game.

E. Victory and Loss Conditions

Teaching Tips: List the modes to be included in your sample game.

F. Opportunities for Creative Play

Teaching Tips: Would you include these features in your sample game?

G. Miscellaneous Issues

Teaching Tips: What limitations would you place on the instant replay feature in your sample game?

III. Core Mechanics

Teaching Tips: Core mechanics come from the original game (if it is a real-world) game, but must be augmented by AI for the athletes, which can be complex.

A. Physics for Sports Games

B. Rating the Athletes

Teaching Tips: List several common and specialized ratings needed in your sample game?

C. Athlete AI Design

Teaching Tips: Flowchart several states for your sample game. Note the importance of setting both individual and collective goals in team games.

D. Injuries

E. Arcade Mode Versus Simulation Mode

Teaching Tips: Select arcade or simulation mode for your sample game. Although a game can have both modes, select only one for your sample game.

F. Simulating Matches Automatically

G. Home-Field Advantage

IV. The Game World

A. Licenses, Trademarks, and Publicity Rights

Teaching Tips: What organization owns the information for your sample game?

B. Audio Commentary

Teaching Tips: List a few standard phrases common to matches in your sport. Identify the triggers for the comments in your sample game.

V. The Presentation Layer

A. Interaction Model

B. Camera Models

Teaching Tips: What camera model is right for your sample game? (There may be more than one.)

C. User Interface Design

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

What sport does not already have several related video games?

Answers will vary. Students should consider sports outside the typical baseball, football, and soccer world.

Discussion Question 2

How realistic should a sports game be? Explain.

Answers will vary. Students should consider that most people playing sports games are familiar with the sport. Even niche sports games, such as gymnastics and curling, have fans familiar with the sport.

II. Web Projects

Web Project 1

Go to <https://www.nfl.info/NFLConsProd/Welcome/CpPrequalify.htm>. Read the pre-qualification terms to become an NFL Licensee. What is required to apply for an NFL license?

Students should use the application to identify the requested information.

Web Project 2

Go to <http://www.usacurl.org>. Download the rules booklet. Translate several rules into directions for the programmers of a new video game based on the sport of curling.

Answers will vary, but students should use the information in the rules to create programming instructions.

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CHAPTER 17 VEHICLE SIMULATIONS

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the different types of vehicle simulation games.
- Know how the design of the game world influences the player's perception of speed.
- Know some ways to design artificial opponents for the game.
- Understand the distinctions between civilian and military flight simulations.
- Be familiar with the various views often used in vehicle simulation interfaces.

CHAPTER OVERVIEW

This chapter discusses the characteristics of vehicle simulations, which enable players to experience driving or piloting a vehicle. Simulations include military and civilian airplanes and organized racing and imagined racing driving simulations for purists and casual players. Realism is usually important in a vehicle simulation, but the user interface can be simplified to improve gameplay for the target audience.

The major sections in this chapter are:

1. **What Are Vehicle Simulations?** Vehicle simulations enable players to experience driving or piloting a vehicle.
2. **Game Features.** Vehicle simulations include military and civilian airplanes and organized racing and imagined racing driving simulations.
3. **Core Mechanics.** Physics, damage-handling and the AI opponents are key to the core mechanics. The landscape and the weather affect the gameplay.
4. **Other Vehicles.** Although planes and automobiles are the most popular vehicles for vehicle simulations, boats, tanks, and spacecraft are also possibilities.
5. **Intellectual Property Rights.** Licensing is not required for military vehicles, but it is required to use the information for any existing civilian vehicle.

6. **The Presentation Layer.** Provide the perspective that is appropriate and simplify the controls and navigation.

CHAPTER OUTLINE

- I. What Are Vehicle Simulations?
- II. Game Features
 - A. The Player's Role
 - B. Competition Modes
 - C. Gameplay and Victory Conditions
- III. Core Mechanics
 - A. Designing Opponents
 - B. Damage
 - C. The Game World
- IV. Other Vehicles
 - A. Boats and Ships
 - B. Tanks and Mechs
 - C. Spacecraft
- V. Intellectual Property Rights
- VI. The Presentation Layer
 - A. Interaction Model
 - B. Camera Model
 - C. User Interface Design

KEY TERMS

None

TEACHING NOTES

Teaching Tips: Select a vehicle to simulate.

I. What Are Vehicle Simulations?

II. Game Features

Teaching Tips: Select a category for your vehicle simulator: civilian versus. military flight; organized versus imaginary racing, etc..

A. The Player's Role

Teaching Tips: The player's role will normally be as a pilot or driver; will she play other roles in other gameplay modes?

B. Competition Modes

Teaching Tips: Select the competition modes for your vehicle simulator.

C. Gameplay and Victory Conditions

Teaching Tips: Determine the gameplay and victory conditions for your vehicle simulator.

III. Core Mechanics

A. Designing Opponents

Teaching Tips: How will the player's opponents behave in your vehicle simulator? What makes one different from another?

B. Damage

Teaching Tips: Determine the way you want to model damage in your vehicle simulator.

C. The Game World

Teaching Tips: How does the setting affect your vehicle simulator?

IV. Other Vehicles

Teaching Tips: Did you use a common vehicle in your vehicle simulator?

A. Boats and Ships

B. Tanks and Mechs

C. Spacecraft

V. Intellectual Property Rights

Teaching Tips: Based on the type of vehicle you selected, is licensing required for your vehicle simulator?

VI. The Presentation Layer

A. Interaction Model

B. Camera Model

Teaching Tips: Which views are needed for your vehicle simulator?

C. User Interface Design

Teaching Tips: What elements are needed for the user interface of your vehicle simulator?

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

What type of vehicle simulation would fill a unique market niche?

Answers will vary. Students should consider unusual vehicles not generally available, such as a dune buggy.

Discussion Question 2

How would you attract players to your game?

Answers will vary. Students should consider the unique aspects of the selected vehicle and the way to market those characteristics.

II. Web Projects

Web Project 1

Go to <http://jawa.janes.com/public/jawa/index.shtml>. What type of information is available at Jane's All the World's Aircraft?

Answers will vary, but students should use the Web site to describe the available information.

Web Project 2

Go to <http://www.champcarstats.com/drivers.htm>. Look up the career information for one of the drivers. Summarize the information.

Answers will vary, but students should use the site to summarize the information for a driver.

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CHAPTER 18 CONSTRUCTION AND MANAGEMENT SIMULATIONS

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the definition of a construction and management simulation.
- Know the differences between plan-and-build and purchase-and-place gameplay mechanics.
- Know the basic gameplay modes and artificial behaviors common to this genre.
- Understand the issues facing a designer of a user interface for this genre.
- Understand the core mechanics of economies, construction, and management.

CHAPTER OVERVIEW

This chapter discusses the characteristics of construction and management simulations. These slow-moving games consist primarily of economic challenges. Players use information about the resources and simulated people (if present) to create and improve the constructed objects. This genre offers more opportunities for creative play than most others.

The major sections in this chapter are:

1. **What Are Construction and Management Simulations?** Players manage a process to build things.
2. **Game Features.** Players build and demolish objects and oversee an operational process, often involving simulated people.
3. **Core Mechanics.** Resources are used to construct the objects. Internal economies tend to be complex.
4. **The Game World.** The setting forms an attractive background where the objects are created.
5. **The Presentation Layer.** The player is multipresent, moving freely around the game world to view it. Because the internal economy is complex, the user interface usually is also.

CHAPTER OUTLINE

- I. What Are Construction and Management Simulations?

- II. Game Features
 - A. The Player's Role
 - B. Progression
 - C. Gameplay
 - D. Victory and Loss Conditions
 - E. Competition Modes
 - F. Simulating Individuals
 - G. Mind Reading
 - H. Advisors
 - I. Pure Business Simulations
 - J. Hybrid Games
- III. Core Mechanics
 - A. Resources
 - B. The Construction Converter
 - C. Drains and Maintenance
 - D. Disasters
- IV. The Game World
- V. The Presentation Layer
 - A. Interaction Model
 - B. Camera Model
 - C. User Interface

KEY TERMS

plan-and-build A construction play mechanic in which the player plans a new object at a location in the environment and the resources necessary to construct it are consumed over time as the object is built. Contrast with *purchase-and-place*.

purchase-and-place A construction play mechanic in which the player purchases a new object by expending some resource and immediately places it in the game world. Contrast with *plan-and-build*.

scalar variable A variable quantity consisting of exactly one value, such as the amount of money in a bank account. The value changes, but there's only one value at any given time. Contrast with *vector variable*.

vector variable A set of related numbers that collectively describe something. In physics, a vector normally describes how to get from one point in space to another (on a 2D plane, this requires two numbers, an angle and a distance). In games, any collection of related data can be considered a vector. Data describing the amount of water available at each point on a map would be considered a vector.

walkthrough mode A mode of play that allows the player to walk through an environment that he has constructed to see what it looks like from the inside; mostly used by construction and management simulations.

TEACHING NOTES

Teaching Tips: Create a new concept for a construction and management simulation. A variety of business ideas could be used. For example, start a bakery or create a village in an unusual time period.

I. What Are Construction and Management Simulations?

II. Game Features

A. The Player's Role

Teaching Tips: What will the player create in your CMS?

B. Progression

Teaching Tips: Will the game have a victory or a loss condition? (Bankruptcy is the usual loss condition.)

C. Gameplay

Teaching Tips: Make decisions regarding control, construction, and demolition.

D. Victory and Loss Conditions

Teaching Tips: If your CMS provides scenarios, create a brief description of a scenario with a victory condition.

E. Competition Modes

F. Simulating Individuals

Teaching Tips: List a few needs that your individuals try to fulfill.

G. Mind Reading

Teaching Tips: How will the player see the individual's needs and fulfillment status?

H. Advisors

Teaching Tips: List a few conditions the advisor will track in your CMS.

I. Pure Business Simulations

J. Hybrid Games

III. Core Mechanics

A. Resources

Teaching Tips: Identify the resources in your CMS.

B. The Construction Converter

Teaching Tips: What is the construction converter in your CMS; that is, what resources go into the construction process, and what comes out of it?

C. Drains and Maintenance

Teaching Tips: for each resource in the game, what is its drain (if any)? Is it automated?

D. Disasters

IV. The Game World

Teaching Tips: Describe the setting for your CMS.

V. The Presentation Layer

A. Interaction Model

Teaching Tips: This is almost always multipresent in the primary gameplay mode. Will your game have other modes with other interaction models? Describe them.

B. Camera Model

Teaching Tips: Describe the camera model(s) used in your CMS.

C. User Interface

Teaching Tips: List several variables that should be displayed in your CMS.

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

Why do players enjoy construction and management simulations?

Answers will vary. Students should identify the desire to overcome economic challenges and the need to create something unique as primary reasons.

Discussion Question 2

How would you attract players to your game?

Answers will vary. Students should consider the unique aspects of the construction and management simulation and the way to market those characteristics. The game world and theme often play a major role.

II. Web Projects

Web Project 1

Go to <http://simcity.ea.com/tipstricks/tipsntricks.php>. Read several of the tips and tricks. Describe how some aspects of the game work.

Answers will vary, but students should use the information available at the Web site to describe a core mechanic of the game.

Web Project 2

Go to http://simcity.ea.com/about/inside_scoop/mysims.php. Based on the information in the article, list a few of the sims' needs.

Answers will vary, but students should use the information to list several of the sims' needs.

WEB RESOURCES

- http://simcity.ea.com/play/simcity_classic.php—Play *SimCity* online.

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CHAPTER 19 ADVENTURE GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the definition of an adventure game and the common game features of the genre.
- Understand the importance of character and story in the genre.
- Describe the different interaction models and perspectives common to adventure games.
- Understand how to use puzzles and inventory in designing an adventure game.

CHAPTER OVERVIEW

This chapter discusses the characteristics of adventure games. The game designer creates a story and a world in which the player experiences the story. The player's avatar is the hero of the story. The hero faces puzzles and conceptual challenges as he moves through the game world.

The major sections in this chapter are:

1. **What Are Adventure Games?** An adventure game is an interactive story about a character that is controlled by the player.
2. **Game Features.** Exploring the world and manipulating objects in the world are essential to an adventure game.
3. **The Presentation Layer.** The player moves, converses with NPCs, and manipulates objects while remaining immersed in the story.

CHAPTER OUTLINE

- I. What Are Adventure Games?
 - A. The Growth of Adventure Games
 - B. Adventure Games Today
- II. Game Features

- A. Setting and Emotional Tone
 - B. Interaction Model
 - C. Camera Model
 - D. Player Roles
 - E. Story and Spatial Structure
 - F. Storytelling
 - G. Challenges
 - H. Conversations with Nonplayer Characters (NPCs)
 - I. Mapping
 - J. Journal Keeping
 - K. A Few Things to Avoid
- III. The Presentation Layer
- A. Avatar Movement
 - B. Manipulating Objects

KEY TERMS

action-adventure A hybrid genre of *action game* and *adventure game*. The action-adventure is now more popular than either of its two constituents.

adventure game An interactive story in which the player takes the role of the protagonist. Puzzle-solving and conceptual reasoning challenges form the majority of the gameplay; physical coordination challenges are few or nonexistent.

TEACHING NOTES

Teaching Tips: Create a new concept for an adventure game.

I. What Are Adventure Games?

Teaching Tips: Ask students to identify currently popular adventure games. Are they pure adventure games or hybrids?

A. The Growth of Adventure Games

B. Adventure Games Today

Teaching Tips: Ask how many students have started playing an adventure game that they didn't complete. Why didn't they finish playing the game?

II. Game Features

A. Setting and Emotional Tone

Teaching Tips: Setting is critical to an adventure game. Ask students to describe a setting and tone for the adventure game concept created at the beginning of the class.

B. Interaction Model

Teaching Tips: Ask students to describe the avatar for the adventure game concept.

C. Camera Model

Teaching Tips: Ask students to select a camera model for the game. Will they choose the traditional context-sensitive perspective?

D. Player Roles

Teaching Tips: Based on the story, what is the player's role?

E. Structure

F. Storytelling

Teaching Tips: Ask students to describe the main problem and its resolution in the game. Note that adventure games almost always map a story onto a physical space, so the story must include a journey and exploration.

G. Challenges

Teaching Tips: Ask students to identify the puzzles and challenges that fit into the adventure game you're designing in class.

H. Conversations with Nonplayer Characters (NPCs)

- I. Mapping
 - J. Journal Keeping
 - K. A Few Things to Avoid
- III. The Presentation Layer
- A. Avatar Movement

Teaching Tips: Based on the camera model, what is the movement interface for the avatar?

- B. Manipulating Objects

Teaching Tips: How will the player be able to identify the active objects in the game?

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

Why are hybrid adventure games becoming more popular than pure adventure games?

Answers will vary. Students should consider that a pure adventure game has a slower pace than many other genres. A hybrid includes components that increase the action, making the game feel faster.

Discussion Question 2

Why don't many players complete an adventure game?

Answers will vary. Students should consider reasons such as the speed, quality, or difficulty of the game. Often the story is not really compelling enough to justify the time investment.

II. Web Projects

Web Project 1

Go to http://www.mobygames.com/featured_article/feature,13/section,57. Read the article titled "What's Happening to Adventure Games?" Identify the problems the author sees with the adventure genre.

Answers will vary, but students should state that fewer adventures are being produced, the genre has lost direction, hybrids are appearing more frequently, and new adventure games have poor sales.

Web Project 2

Go to <http://www.adventureclassicgaming.com/index.php/site/reviews/88>. Read the article titled "King's Quest III: To Heir is Human," by Joppe Bos. Identify the innovations in the *King's Quest* game.

Answers will vary, but students should include the Adventure Game Interface (AGI) and the pseudo-3D graphic environment.

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CHAPTER 20 ARTIFICIAL LIFE AND PUZZLE GAMES

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Know the different forms of artificial life games and simulations.
- Design basic artificial life systems.
- Know the steps to designing puzzle games.
- Understand the player's needs for puzzle games.

CHAPTER OVERVIEW

This chapter discusses the characteristics of artificial life games and puzzle games. Most A-life games focus on maintaining and growing a population of unique organisms. Puzzles appear in games from a variety of genres. However, puzzle solving is the primary activity in puzzle games, though puzzles can occur within a storyline or lead up to some larger goal.

The major sections in this chapter are:

1. **Artificial Life Games.** Artificial life games include artificial pets, god games, and genetic artificial life games.
2. **Puzzle Games.** Successful puzzle games need to be challenging, visually attractive, fun, and fresh.

CHAPTER OUTLINE

- I. Artificial Life Games
 - A. Artificial Pets
 - B. *The Sims*
 - C. God Games
 - D. Genetic A-Life Games

- II. Puzzle Games
 - A. Scott Kim's Eight Steps
 - B. What Computers Bring to Puzzles
 - C. Checking the Victory Condition

KEY TERMS

None

TEACHING NOTES

I. Artificial Life Games

A. Artificial Pets

Teaching Tips: How would you create a new concept for an artificial pet?

B. *The Sims*

Teaching Tips: Ask students to describe what they like about playing *The Sims*. Answers will vary considerably, as the game offers the player a choice of goals.

C. God Games

Teaching Tips: How would you create a new concept for a god game?

D. Genetic A-Life Games

Teaching Tips: How would you create a new concept for a genetic A-life game?

II. Puzzle Games

A. Scott Kim's Eight Steps

B. What Computers Bring to Puzzles

Teaching Tips: Why would any player prefer a noncomputer puzzle?

C. Checking the Victory Condition

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

Why do players enjoy artificial pets?

Answers will vary. Students should consider how the artificial pet provides entertainment.

Discussion Question 2

How could a research tool about artificial life become a game concept?

Answers will vary. Students should consider that anything could become a game concept.

II. Web Projects

Web Project 1

Go to <http://www.scottkim.com/whatido/index.html>. Describe the services Scott Kim offers.

Answers will vary, but students should include services such as writing puzzles that are included in other games and writing monthly puzzles for magazines.

Web Project 2

Go to <http://www.spore.com/what>. Describe the five phases of the development of civilization in the game titled *Spore*.

Answers will vary, but students should include the cell phase, creature phase, tribal phase, civilization phase, and space phase.

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CHAPTER 21 ONLINE GAMING

CHAPTER OBJECTIVES

When students have finished reading this chapter, they will be able to:

- Understand the advantages and disadvantages of online play as compared with single-player play.
- Understand key design issues for online games, including handling arriving and disappearing players, real-time and turn-based play, chat mechanisms, and designing to prevent player collusion.
- Be familiar with some of the technical security problems of online games and some solutions.
- Know how persistent worlds differ from conventional games and what this implies for storytelling, avatar creation and death, and the internal economics of the game world.
- Be familiar with the issues surrounding player-versus-player combat in online games.

CHAPTER OVERVIEW

This chapter discusses the characteristics peculiar to online games without regard to genre. Creating an online game brings a new set of challenges to game designers. Players can log in to play at any time and log out just as quickly. Persistent worlds are permanent environments that see players come and go while the online game world continues.

The major sections in this chapter are:

1. **What Are Online Games?** “Online games” are multiplayer distributed games in which the players’ machines are connected by a network.
2. **Advantages of Online Games.** Some advantages for designers and players are identified.
3. **Disadvantages of Online Games.** Designers of online games face some disadvantages, such as technical issues and the ongoing need to produce fresh content.
4. **Design Issues for Online Gaming.** Key issues include handling player arrivals and departures, creating chat mechanisms that discourage abusive behavior, designing to prevent player collusion, and technical security problems.
5. **Persistent Worlds.** Permanent environments enable players to log in and play at any time.

CHAPTER OUTLINE

- I. What Are Online Games?
- II. Advantages of Online Games
 - A. Player Socializing
 - B. Human Intelligence Instead of Artificial Intelligence
 - C. Online Gameplay Versus Local Multiplayer Gameplay
- III. Disadvantages of Online Games
 - A. Technical Issues
 - B. It's Harder to Suspend Disbelief
 - C. Misbehavior
 - D. The Need to Produce Content
 - E. Customer Service
- IV. Design Issues for Online Gaming
 - A. Arriving Players
 - B. Disappearing Players
 - C. Real-Time Versus Turn-Based Games
 - D. Chat
 - E. Collusion
 - F. Technical Security
- V. Persistent Worlds
 - A. How Persistent Worlds Differ from Ordinary Games
 - B. The Four Types of Players
 - C. Creating an Avatar
 - D. World Models
 - E. Avatar Death
 - F. The Player-Killer (PK) Problem
 - G. The Nature of Time

H. Persistent World Economies

KEY TERMS

None

TEACHING NOTES

Teaching Tips: Select an online game that can be examined in class. A good source is <http://www.yahoo.com>. The site has a wide supply of online games.

I. What Are Online Games?

II. Advantages of Online Games

Teaching Tips: How do these advantages attract players?

- A. Player Socializing
- B. Human Intelligence Instead of Artificial Intelligence
- C. Online Gameplay Versus Local Multiplayer Gameplay

III. Disadvantages of Online Games

Teaching Tips: How do these disadvantages deter designers?

- A. Technical Issues
- B. It's Harder to Suspend Disbelief
- C. Misbehavior
- D. The Need to Produce Content
- E. Customer Service

IV. Design Issues for Online Gaming

Teaching Tips: Use the online games at <http://www.yahoo.com> to illustrate the topics in this section. Record the length of time needed to enter one of the online card games.

- A. Arriving Players
- B. Disappearing Players
- C. Real-Time Versus Turn-Based Games
- D. Chat

Teaching Tips: Ask students to describe some of the chat mechanisms they have used. What facilities did the game offer to prevent abusive behavior?

E. Collusion

Teaching Tips: Ask students if they have ever colluded to beat an online game (or known someone who did). What systems might the game have implemented to prevent it?

F. Technical Security

V. Persistent Worlds

Teaching Tips: Using information from students who have played online games in persistent worlds, create a chart showing how different games handle things such as avatar death and PvP.

A. How Persistent Worlds Differ from Ordinary Games

B. The Four Types of Players

Teaching Tips: Ask students if they feel they belong to one of these categories. Is four enough, or should there be more, and if so, how would they be different?

C. Creating an Avatar

D. World Models

E. Avatar Death

F. The Player-Killer (PK) Problem

G. The Nature of Time

H. Persistent World Economies

PROJECTS/EXERCISES

I. Discussion Questions

Discussion Question 1

What communication alternatives are used in online gaming today?

Answers will vary. Students should consider personal messaging, TeamSpeak, and Ventrilo.

Discussion Question 2

Why would a player choose an online game rather than a game played alone?

Answers will vary. Students should consider the social interaction and variety of games available.

II. Web Projects

Web Project

Go to <http://www.popcap.com/aboutus.php>. Describe the development and growth of PopCap Games, Inc.

Answers will vary, but students should include information about its founding, growth, and games produced.