FOUNDATIONS IN MEDIA AND DIGITAL DESIGN: ANIMATION & GAME DESIGN

TEACHER GUIDE

PRINCIPLES OF GAME DESIGN

UNIT 2
GAME
DESIGN

DIGITALMEDIAARTS

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Unit Overview

Why do people play games? How are games structured? How can you design a video game that creates an engaging experience for a player? In this unit, students learn principles and strategies for designing games. Students play and analyze a variety of games, exploring both game structure and how the games are played. Students create a "reverse-design document" of an existing game. They unpack the design elements of the game and identify components and features—such as game play, level of challenge, and the game's visual environment—that make the game engaging.

For their unit project, students work in teams to design and create a simple video game using game development software. They test their game with classmates, and get feedback on how to revise and improve it. Teams then present their games to classmates and, ideally, to arts, media, and entertainment (AME) professionals.

Unit Length

40 50-minute sessions

Unit Project Description

Students work in teams to design and develop a simple video game. Students develop a concept for their game and design the following game elements:

- *Game play:* How the game works—its rules, structure, and player objectives
- *User interface:* How the player interacts with the game and receives information and feedback during game play
- *Visual style:* How the art and graphics of the game are used to both set a mood and engage players

Students complete a design document and wireframes that show the user interface at different points in the game. Students use basic game development software to create their game, test their game by having another team play it, and revise their game based on player feedback. Students also create art for their games; depending on the software, students may create digital art that they use in the actual video game, or concept art showing what their finished game world and a character or objects in the game would look like. At the end of the unit, students use all the materials they have developed to present their game to classmates and, ideally, to AME professionals.

Assessment

Unit activities can serve as formative assessment tools. Observe students' developing techniques to gather information about student progress and to identify concepts or skills to reinforce within your instructional practice. The following activities are particularly useful for formative assessment:

- Using game development software to create a simple game (Activity 1B)
- Journals 3 and 4
- **Handout 7: Reverse-Design Document** (Activities 2A and 2B)
- Video game treatment (Activity 3A.2)
- Optional game design challenges (see **Appendix C**)

The project-based nature of the unit allows students to demonstrate their learning through authentic and relevant applications. For this unit, the summative assessment consists of the following items, which will be included in students' portfolios:

- **Handout 11: Game Design Document Template**
- Game interface wireframes
- Game art (either digital art used in the game or concept art showing what a polished version of their game would look like)
- Completed video game
- Game presentation

The unit's Assessment Checklists detail the requirements that students must meet in order to successfully complete the project, and suggest a weight for each component. You will need to determine which specific technical and fine art skills you will teach in the unit and the criteria you will use to assess students' work.

If you wish to use a rubric, you can develop a tool that is consistent with your school's assessment system.

Framing Questions

- Why do people play video games?
- What are the principles of good game design?
- How do game-play mechanics and visual elements interact to create an engaging and compelling game?
- What kind of game do I want to create?

Understandings

- Game-play mechanics, the level of challenge, the visual environment, and other game elements and features affect how a player experiences a game.
- Successful video games use interactivity, design, and visual elements to engage players and tap into their emotions.
- Game design and development is an iterative process that requires several rounds of testing and revising.

Technical Skills Taught and Practiced

- Principles of game design
- Interface design
- Game documentation
- Game development
- Optional: Basic programming (depends on software used)
- Game testing
- Creating game art

Where the Unit Fits In

This unit builds on what students have learned about storytelling, the three phases of media production, and visual principles of media production during *Foundations in Media and Digital Design: Audio & Video*.

Unit 2: Principles of Game Design also builds on *Foundations in Visual Arts, Unit 6: Games for Good*, drawing on what students learned in that unit about video game design.

Student Prerequisites

- Students should have completed ninth grade English language arts and *D/M/A Foundations in Visual Arts* or an equivalent year-long introductory visual arts course.
- Students should be familiar with the elements of art and principles of design.
- During the unit students create game art, and one option is for students to create concept art. If you choose this option, students should have some experience designing concept art. Ideally, students will have completed *Foundations in Visual Arts Unit 4: Make Me a World*, in which students create concept art for a TV show, movie, or video game.
- Ideally, students will also have completed *Foundations in Visual Arts Unit 6: Games for Good*, in which students develop an idea and create art for a video game that informs or advocates about an issue that interests them.

Adapting the Unit

Game Development Software: Given the variety of technology available and student experience levels, the unit is designed to be flexible enough to meet the needs of different classroom situations. You will need to determine which software students use to develop their games. Options range from simple "drag and drop" software to software that incorporates basic programming. (See **Appendix A: Game Development Software** for a detailed description of different gaming software options.) Depending on the software you choose, you may need to plan for additional time to teach the unit. Your software choice may also limit the kinds of games students develop. For example, if students use Gamestar Mechanic, they can only create platform games (games in which characters jump on and over objects and platforms, such as the *Super Mario* game series) or top-down games using a pre-designed set of game sprites.

Using the Unit Without Software: You can also adapt the unit to have students design games without using game development software. For example:

- Have students design their games and then create a physical prototype of the game. **Appendix D: Physical Prototyping Activity** includes instructions for a prototyping activity.
- Have students design and create a board game rather than a video game. This option will require more substantial modification of the unit, which focuses primarily on video games (although many of the same design principles apply to both video games and board games).

Creating Art: If your students have visual arts skills and interest, you may want to expand the focus on their game's graphic design. For example, students might spend more time creating characters for or designing the world of their video game, using graphic design software. Or, if students are creating concept art, you may want to have each student create a completed artwork (such as a painting) based on one of their team's sketches.

Career Profile Project: The unit is set up to have students work on the Career Profile project independently, primarily outside of class. However, you may choose to have students work on this project in a more structured way during class. Please note that this approach will take additional time.

If students have taken *D/M/A Foundations in Media and Digital Design: Audio & Video*, they will have completed the Career Profile project. You may decide not to have them complete it again during this course.

The instructions for the Career Profile project in this unit assume that students started working on the project during *D/M/A Foundations in Media and Digital Design: Animation & Game Design, Unit 1: The Animated World*. If this is not the case, you can introduce the project and have students complete it during this unit. **Appendix E: The Career Profile Project** includes an introduction to the project and student handouts.

Pacing and Sequencing

You will need to decide ahead of time how complex students' game designs can be. You may want to set limits on students' designs, such as limiting them to the development of one game level, or limiting them to designing games with a specific kind of goal (such as collecting objects or racing to the finish). Some limitations may be imposed by the game development software you choose.

If students build their games using one of the more complex game development software programs, such as *Game Maker*, you may need to add additional time for students to learn how to use the software and for game development.

Appendix C: Game Design Challenges contains a series of exercises in which students must quickly design or redesign a game. You may want to have students complete the challenges to give them more practice thinking about and designing games. Throughout the unit, Teacher's Notes identify places where specific game design challenges are particularly relevant to what students are learning.

You may wish to invite professionals to students' design challenge pitches and have them give feedback on students' ideas.

Connection to Integrated Academic Units

Two- to three-week units, taught by teachers in the academic disciplines, help students integrate what they are learning in *Principles of Game Design* with core academic classes.

In ***Cold War Games*** (World History), students take on the role of video game researchers to learn about the complex web of events, conflicts, and policies that constituted the global Cold War. Students then use their understanding of this era to write a paper that contains recommendations for the design of a game based on a pivotal event during this period of history. One option is to have students create games based on the video game design concept they outlined for Cold War Games. (Students may need to substantially simplify their concept.)

The Power of the Nucleus (Chemistry) presents contemporary societal issues, including nuclear weapons, irradiated food, and nuclear waste, as a way to introduce and frame teaching of nuclear chemistry concepts. Students apply their learning to create media products, such as brochures, posters, or video game designs, that use science as the basis for advocating or educating about a particular issue related to nuclear chemistry. Students can use these issues as the basis for their games in this unit.

One option for *The Power of the Nucleus*, if the science teacher is also collaborating with a history teacher teaching *Cold War Games*, is for students to develop game designs focused on issues related to nuclear weapons. You can have students create games based on these game designs. (Students may need to substantially simplify their concepts.)

In **Physical Reality in Video Games** (Physics), students apply real-world principles of mechanics to the virtual worlds of video games. They learn how to estimate the mechanical properties of objects in a virtual world, and investigate projectile motion in both real and video game worlds. For the final project, students analyze the principles of mechanics used or violated in a video game of their choice, and present their findings to their classmates.

Other Opportunities for Integration

- Have students develop their game based on the video game design concept they outlined for the integrated World History unit, ***Cold War Games***. (Students may need to substantially simplify their concept.)
- Work with an English language arts teacher to have students design games based on a book or short story they are reading in class.
- Work with an English language arts teacher to structure or support students' Career Profile research and to review expectations for formal writing.
- Work with a social studies teacher to have students design games based on real-world events they are learning about in class.

Career Connections

In this unit, students learn and practice many skills, such as writing treatments, documenting the design process, preparing and delivering a presentation, designing a game interface, and creating games. These are essential skills for success in game design careers, as well as in other areas of the AME industry.

Ideas for Involvement with Professionals

- Have students visit a game development company or the studio of a freelance game designer.
- Invite a game designer to talk to the class about how game projects are initiated and the different roles played by members of a design team.
- Invite the owner or manager of a local retail game store to discuss game genres, game platforms, and trends in games' market appeal.
- Invite a journalist or writer who covers the game industry to discuss the industry's evolution.
- Have AME professionals critique students' work in progress (such as their game treatments or their game design challenge pitches) or attend the presentation at the end of the unit.
- Have students read or watch online interviews with game developers (see *Media & Resources* for links).

Key Careers

Through activities in this unit, students learn about the following careers:

- Associate producer
- Lead programmer
- Level designer

Table of Activities

Part 1: Introduction to Games (5 sessions)

Students play a variety of digital and nondigital games. They reflect on how games are structured, identify the formal and dramatic elements of games, and consider the features that make games successful and fun to play. Students are introduced to the software they will use to create their games, and then use this software to create a simple game.

Activity 1A: Elements and Features of Games (2 sessions)

1A.1: What's in a Game?	Students are introduced to the unit and discuss the appeal of different games. In teams, students play and write a short description of a game.
1A.2: Defining Game Elements and Features	Students form new teams and discuss the games they played. Students develop a list of common elements in the games and highlight the features that make particular games distinctive. The class discusses the formal and dramatic elements of games.
1A.3: The Weekly Critique	Students are introduced to the weekly critique assignment, in which they play and critique a game on their own each week.

Activity 1B: Exploring Game Development Software (3 sessions)

Students learn about the software they will use to create the game for their unit project, and create a simple game.

Part 2: Reverse Design (5 sessions)

Students choose an existing video game, work backward to understand its different design elements, and complete a reverse-design document for their chosen game. By "unpacking" the components of an existing game, students gain an understanding of game design that they will use to plan their own games later in the unit.

Activity 2A: Introduction to Reverse Design (3 sessions)

Students are introduced to the reverse-design project and work in teams to choose and analyze a video game. Students complete a reverse-design document of the game's formal and dramatic elements. Teams identify strengths and weaknesses of the game and share their findings with the class.

Activity 2B: User Interface (2 sessions)

Students play video games that have different types of interfaces. They brainstorm a list of qualities of successful interface design.

Part 3: Video Game Design and Development (25 sessions)

Students work with their project teams to develop their video game idea, writing a treatment and creating a game design document. They build wireframes for the game, develop game art, and create the game. Paired teams engage in a round of play-testing, and teams refine their games based on feedback.

Activity 3A: Concept Development (2 sessions)

3A.1: ***Choosing a Game Idea***	Students brainstorm ideas for their game. Teams discuss game ideas and choose one idea to develop.
3A.2: ***Writing a Treatment***	Team members work together to write a short treatment of their video game. Teams share treatments with another team and then revise them based on the feedback they receive.

Activity 3B: Preliminary Game Design (2 sessions)

Students develop the design of their game and complete a draft of their game design document.

Activity 3C: Interface Design (2 sessions)

Teams finalize the manual and visual interface for their game. Students create a control table and a set of wireframe interfaces for various screens in their game.

Activity 3D: Art Design (5 sessions)

3D.1: ***Analyzing Art***	Students look at screenshots of video games and analyze the elements of art and the techniques used to engage players.
3D.2: ***Creating Game Art***	Students create rough sketches of art for their video games, share their sketches with the class, and create polished concept art sketches or digital art that incorporates the feedback they receive.

Activity 3E: Creating the Game (14 sessions)

3E.1: ***Game Development***	Students learn techniques for creating games and then, in their teams, create their game.
3E.2: ***Discussing Gaming Careers***	Students learn about careers related to the unit work, and share the progress they've made on the Career Profile project.
3E.3: ***Play-Testing***	Each team play-tests another team's game and provides feedback and suggestions for improving the game.
3E.4: ***Revising the Game***	Students revise their game based on feedback from the play-testing session.

Part 4: Presenting the Game (5 sessions)

Students complete their Career Profile project, and prepare and deliver presentations for their video game.

Activity 4A: The Career Profile Project (2 sessions)

4A.1: ***Preparing the Presentation***	Students complete work on their Career Profile project and prepare a short presentation for their classmates.
4A.2: ***Career Profile Presentations***	Students meet in small groups to share their Career Profile presentations.

Activity 4B: Preparing and Delivering the Presentation (3 sessions)

Students work in their teams to develop and deliver the presentation for their game. They reflect on what they have learned throughout the unit.

Advance Preparation

- Look at **Materials Needed** at the end of the unit and order any needed equipment or supplies.
- Read **Student Prerequisites**, **Adapting the Unit**, and **Pacing and Sequencing** and plan for any additional activities or support that students will need to successfully complete the unit.
- Read **Career Connections**, determine how you will engage students with AME professionals during this unit, and either invite AME professionals to visit the classroom (particularly during the presentations at the end of the unit) or arrange for a class visit to a related business.
- Internet resources, provided as links in *Media & Resources*, are recommended throughout the unit for student or in-class use. These Web sites have been checked for their availability and for advertising and other inappropriate content. However, because Web sites' policies and content change frequently, we suggest that you preview the sites shortly before using them.
- Select the game development software that students will use to create their games (see **Appendix A: Game Development Software** for information about specific programs). Become familiar with the program you will use during the unit and determine how you will introduce it to students. See *Media & Resources* for online tutorials and other resources regarding game development software.
- If your students are not using game development software to create video games, you can instead have them create physical prototypes of the video games they've designed. (See **Appendix D: Physical Prototyping Activity**.)
- Throughout the unit, students play a variety of video games, such as online games, hand-held games, and console games. During Activity 1A, in addition to video games, students also play other types of games, such as board games, card games, and physical-skill games. Collect a variety of video and other games for students to play throughout the unit. You may also want to have students bring in their own games, or to bring in cell phones with games loaded on them. Be sure to review students' games for appropriate content, and see that games are labeled with students' names so that they can be returned after the activity. See *Media & Resources* for game suggestions.
- Address any issues, such as firewalls, related to accessing Web sites, other Internet links, and online video games at your school as necessary. For example, you may want to see if the IT department can unblock access to certain game sites for your classroom. Another option is to download games at a location that doesn't block access (such as your home or a public library), put the files on storage media, and install them on your classroom computers.

- In Activity 3D.2, students create game art. Before the activity, determine whether students will create digital art to use in their games or concept art showing what a polished version of their game would look like. Your decision will depend partly on whether the game development software students are using allows digital art to be imported and used, and partly on whether students are already familiar with using illustration software to make art (and if they are not, whether additional time is available to teach students how to do so).

  If you decide to have students create concept art, but they have no previous experience in creating concept art, you may want to review activities from Part 3 of *Foundations in Visual Arts, Unit 4: Make Me a World*.
- If your students completed the Career Profile project while taking *D/M/A Foundations in Media and Digital Design: Audio & Video*, decide whether to have them complete the project a second time in this course.
- Look at **Appendix C: Game Design Challenges** and determine whether you will assign these during the unit. Teacher's Notes in the unit identify places where specific design challenges are particularly relevant to what students are learning.

Part 1: Introduction to Games

Students play a variety of digital and nondigital games. They reflect on how games are structured, identify the formal and dramatic elements of games, and consider the features that make games successful and fun to play. Students are introduced to the software they will use to create their games, and then use this software to create a simple game.

Length

5 50-minute sessions

Activity 1A: Elements and Features of Games

Students play and browse through various games, identifying and discussing game elements and the features that make them fun to play. Students are introduced to the weekly critique assignment.

Sequence

1A.1: What's in a Game?	Students are introduced to the unit and discuss the appeal of different games. In teams, students play and write a short description of a game.
1A.2: Defining Game Elements and Features	Students form new teams and discuss the games they played. Students develop a list of common elements in the games and highlight the features that make particular games distinctive. The class discusses the formal and dramatic elements of games.
1A.3: The Weekly Critique	Students are introduced to the weekly critique assignment, in which they play and critique a game on their own each week.

Materials Needed

- **Handout 1: Unit 2 Overview**
- **Handout 2: Unit 2 Journal Assignments**
- **Handout 3: Instructions for *What's in a Game?***
- Several types of games for students to play (see *Advance Preparation*)
- Optional: Board games, card games, and video games that students bring in (see *Advance Preparation* at the beginning of the unit)
- **Handout 4: Elements of Games**
- **Handout 5: Weekly Critique**
- **Assessment Checklist 1: Weekly Critique**

> **Note:** Give students extra copies of Handout 5 and Assessment Checklist 1 so that they can complete one handout and one assessment each week.

- Optional: List of links to online video games (see *Advance Preparation*)

Advance Preparation

- Before Activity 1A.1, select several games (board games, card games, physical-skill games, and video games) for students to play in class. Make sure that there are enough games for teams of three or four students to each play a game. Choose games that vary in theme, objectives, genre, and platform. Ideally, the games selected should represent a variety of game types. It's okay to use games that students are familiar with, as well as games they may not be familiar with. For unfamiliar games, try to choose ones that students will be able to learn fairly quickly. (See *Media & Resources* for game suggestions.)

> **Note:** A sample analysis of one level of *Super Mario Galaxy* for Nintendo Wii is provided in this activity.

- In Activity 1A.3, students are introduced to the weekly critique assignment, in which they play and critique a game on their own each week. Students may choose board games, card games, physical-skill games, or video games. You may want to provide students with a list of links to online video games. See *Media & Resources* for suggestions.

1A.1: What's in a Game?

1. Introduce the unit.
Distribute **Handout 1: Unit 2 Overview**. Explain to students that in this unit they will learn about the principles of game design. Tell them that for the unit project they will come up with their own idea for a simple video game and then use game design software to create that game.

Tell students that as they design their games, they will focus on creating the most fun and satisfying experience they can for players.

2. Have students reflect on a favorite game.
Distribute **Handout 2: Journal Assignments.** Tell students that to get them thinking about the player experience, they will reflect on a game they have already played. Have students complete **Journal 1.**

Journal 1

Think of one of your favorite games. It could be a video game, a board game, a sport, or any other kind of game that you played when you were younger or that you like to play now. Write a paragraph that describes the game's "player experience":

- As a player, what do you do in the game? (Are you moving around, using your reflexes, using your imagination?)
- What do you experience that makes the game fun?
- How do you feel when you are playing the game?

Be descriptive! Focus your writing on how you *feel* when you play the game rather than on the specific rules or procedures of the game.

Look through your paragraph description and circle key words and phrases that define the experience of playing this game. Which aspects of this experience, if any, do you want to recreate in your video game for the unit project?

3. Have students share attributes of their games' "player experience."
Have volunteers share some of the words and phrases they circled in their journals. Create a class list of attributes of the playing experience of students' favorite games.

Teacher's Notes: Attributes of Game-Playing Experiences

Students may come up with some of the following descriptive words and phrases to describe their game-playing experiences:

- Exciting
- Challenging
- Escape—allows me to be immersed in the game world
- Allows me to be someone else
- Uses quick reflexes
- Requires strategy
- Allows for creativity
- Always something new
- Allows me to interact with other players
- Makes me think

Teacher's Notes: Discussing Aspects of Player Experience

Focus the discussion on aspects of the player experience, rather than on other game attributes that students like. For example, if a student says he likes a particular game because it has cool special effects, ask that student to describe how the special effects affect his playing experience.

Where appropriate, probe to have students expand on their descriptive terms. For example, if students describe a game as "fun," ask them to give details about what they mean by *fun*, how they define *fun*, and what they were doing during the game that made it feel fun.

Tell students that when they design their own game, they should keep in mind what makes their favorite games fun to play, as well as what kinds of playing experiences they don't like.

4. Introduce the *What's in a Game?* activity.
Tell students that another important part of game design is understanding how games are structured. Explain that students will play a game, explore its structure, and compare it to games that their classmates play.

Divide the class into small teams. Distribute **Handout 3: Instructions for *What's in a Game?*** and review it with students.

5. Have teams play their assigned game.
Assign each team one of the games you've selected. Give students a few minutes to familiarize themselves with the rules of the game and how to play it.

Tell students that they will have 10 minutes to play their assigned game.

> **Note:** Some games work best with just one or two players. If the number of players on a team is greater than the recommended number of players for the game, have teams choose one or two students to play the game while the rest of the team observes.

6. Have students write a description of their game.
Tell students to imagine that they are describing the game to someone who has never seen or heard of it—or any game similar to it.

Have students individually write a paragraph that describes the game and how it is played. Explain that they will later form new teams and compare each other's game descriptions.

7. Optional: Have team members share their paragraphs and revise as needed.
Have students share their paragraphs with their current team and then revise them, based on the feedback they receive.

Handout 1:
Unit 2 Overview

Think about all the different kinds of games that you like to play. What is it that makes them fun? Do you like fast-paced games where you need to use quick reflexes? Do you like games in which you need to think strategically and anticipate your competitor's next move? Do you like games that tell a story? Games that allow you to take on another identity or explore an alternate universe? And have you ever wondered who came up with the idea for your favorite game—or how that person structured the game to make it functional, challenging, and fun to play?

In this unit, you'll learn to think like a game designer. You'll determine how different types of games are structured, and you'll learn principles and strategies for designing games. For your unit project, you'll work as part of a team to design and create a simple video game.

Your work in this unit will revolve around the following questions:

- *Why do people play video games?*
- *What are the principles of good game design?*
- *How do game-play mechanics and visual elements interact to create an engaging and compelling game?*
- *What kind of game do I want to create?*

Unit Project

For the unit project, you'll take on the role of a designer for a video game company. Your task is to come up with an idea for a simple new video game. You'll work with a team to develop the theme of the game, its rules, and the mood and look of the game. Your team will design the user interface for the game and produce game art. You'll use game development software to create the actual game. At the end of the unit, you'll present your game to your classmates.

What You Will Do in This Unit

Play games. Play different games, identify common game elements and features that distinguish games from one another, and discuss the kinds of games you like to play and why you like to play them.

Critique games. Play, describe, analyze, and critique a game on your own each week.

Reverse-design a video game. Work as part of a team to analyze a video game by "pulling apart" its different components to find out how the parts were put together by the original game designer.

Choose an idea for a new game. With your team, develop an idea for a new video game.

Describe your game. Write a short treatment for your video game idea and present it to your classmates.

Complete a design document. Describe specific elements and features of your game.

Create user interface wireframes. Draw sketches of different game screens that show how players will interact with the game.

Create game art. Create art to use in your video game, or create concept art for the game.

Create your game. Use game development software to create your game.

Test your game with your classmates. Partner with another team to give and receive feedback on each other's games.

Revise your game. Use peer feedback to revise your game.

Present your game. Share your game with an audience.

Portfolio Requirements

You will keep a portfolio of work throughout the unit that includes the following items:

- Video game treatment
- Game design document
- Game interface wireframes
- Game art
- Completed video game

Vocabulary Used in This Unit

Camera viewpoint: The angle from which the game world is depicted on a video game screen.

Dramatic elements: Components of games that are designed to engage players, such as story and characters.

Formal elements: Components that make up a game, such as game objectives and rules.

Game design document: A written piece that outlines the essential elements of a game, including game objectives, rules, intended audience, storyline, and unique selling points.

Game platform: The device on which a game is played. Examples of game platforms are consoles, personal computers, and hand-held portable devices.

Game world: The physical world in which the game takes place. For example, a game world might consist of physical locations in a game, such as geographic places; landscape features, such as bodies of water; and environmental features, such as buildings. In puzzle or abstract games, the game world may consist of such items as grids, geometrics objects, and numbers or letters.

Manual interface: The controls that players manipulate physically, such as a joystick or keys on a computer keyboard.

Play-test: The process of playing a prototype of a game and providing feedback on how functional, playable, and engaging the game is.

Power-up: Something, such as an object, that gives a video game character a boost of strength, power, wealth, or speed.

Prototype: A working model of a game idea.

Visual interface: The display shown on a video game screen that gives a player the information needed to play and make decisions during the game, such as the number of lives remaining, location within the game world, and links to other menus.

Wireframe: A sketch of the visual interface of one screen in a video game.

Handout 2:
Unit 2 Journal Assignments

Journal 1

Think of one of your favorite games. It could be a video game, a board game, a sport, or any other kind of game that you played when you were younger or that you like to play now. Write a paragraph that describes the game's "player experience":

- As a player, what do you do in the game? (Are you moving around, using your reflexes, using your imagination?)
- What do you experience that makes the game fun?
- How do you feel when you are playing the game?

Be descriptive! Focus your writing on how you *feel* when you play the game rather than on the specific rules or procedures of the game.

Look through your paragraph description and circle key words and phrases that define the experience of playing this game. Which aspects of this experience, if any, do you want to recreate in your video game for the unit project?

Journal 2

List three of your favorite games. Name the objective, or objectives, of each game. Are there any similarities in these games?

Based on the games' objectives, try to define the type of game that has the most appeal for you. What do you think that indicates about your personality, interests, or skills?

Journal 3

Think about all the games that you have played, analyzed, or seen in this class and at home. Which game's interface do you like the most? Why? Describe how the interface affects your enjoyment of a game.

Think about an idea you have for a new video game that you'd like to design. What kind of interface would work best for this game? Why?

Journal 4

Game ideas can come from lots of different places. Complete the following prompts and use your responses to help you generate ideas to use as the basis for a new game.

- My favorite sports or games that I played outside when I was younger were . . .
- My favorite indoor games (board games, etc.) that I played when I was younger were . . .
- Right now, my favorite non-video games are . . .
- My favorite video games are . . .
- My favorite movies are . . .
- A TV show that I like is . . .
- A reality TV show that I like is . . .
- One of the best books I ever read was . . .
- One of the most fun things I ever did was . . .
  (This could be any experience you had, such as being in a play, winning a basketball game against a tough opponent, or going on a trip.)

Look through your list. Do any of the games or experiences that you've already had lend themselves to ideas for a new video game? Brainstorm two ideas for games, based on any of the prompts you answered above or a totally new idea. Be sure to keep in mind the limits of the game development software you're using, and focus on ideas that are simple enough to complete in the time that you have available.

Each of your ideas should answer two basic questions from the perspective of a player:

- Who are you?
- What do you do (or what are you trying to do) during the game?

Journal 5

- What was challenging about building and play-testing your game?
- What is one piece of feedback you got from your play-testers that was helpful?
- What is one change you want to make to the game based on the feedback you got from your play-testers?

Journal 6

- What was your favorite part of the video game design and creation process? What did you especially enjoy about it?
- What was the most challenging part of the video game design and creation process? What did you find especially challenging about it?
- What did you learn about the principles of game design during this unit?
- What did you learn about the role that art and graphics play in creating a successful video game?
- What did you learn about the process of creating a game?
- What would you do differently if you were to do this project again?

Handout 3:
Instructions for *What's in a Game?*

What is a game? What elements are common to all games? What features make games distinctive? To help you define what a game is, you and your team will play a game and then compare its elements and features with other games played by your classmates.

First, your teacher will assign your team a game. You'll then complete the steps listed below.

Step 1: Familiarize Yourself with the Game

Decide which team members will play the game. If your team has more members than are needed to play the game, have some team members observe while others play.

Take a few minutes to become familiar with the rules and procedures of the game. Make sure that all the players understand how the game works.

Step 2: Play the Game

Play the game for 10 minutes. It's okay if you don't finish it. Play long enough to get a sense of the playing experience—what you do as a player, what you're trying to accomplish, and how it feels to play the game.

Step 3: Write a Paragraph About the Game

Imagine that you need to describe the game to someone who has never played it or any game like it. Each team member should write a paragraph that gives a basic description of the game and how it is played.

Step 4: Compare Games: Share and Listen

Form a new team with three other students, each of whom played a different game. In your new team, share your game description, and listen to descriptions of other games.

Step 5: Identify Common Elements and Distinct Features

Draw a rectangle on a sheet of paper. Write each game's name in an inside corner of the rectangle. In the middle of the rectangle, list elements common to all of the games. Outside each corner of the rectangle, list game elements or features distinct to each game. Your rectangle will look like this:

Distinct Features of Game 1

- Distinct feature #1
- Distinct feature #2
- Distinct feature #3
- Etc.

Distinct Features of Game 2

- Distinct feature #1
- Distinct feature #2
- Distinct feature #3
- Etc.

Name of Game 1

Name of Game 2

(Elements Common to All Games)

- Common element #1
- Common element #2
- Common element #2
- Etc.

Name of Game 3

Name of Game 4

Distinct Features of Game 3

- Distinct feature #1
- Distinct feature #2
- Distinct feature #3
- Etc.

Distinct Features of Game 4

- Distinct feature #1
- Distinct feature #2
- Distinct feature #3
- Etc.

1A.2: Defining Game Elements and Features

1. Form new teams.
Create new teams of four, comprising students who played different games during Activity 1A.1.

2. Have team members share their game descriptions.
Explain that students should listen to the different game descriptions and take note of the similarities and differences among the various games.

3. Have students identify common elements and distinct features.
Give teams sheets of chart paper and have them draw a rectangle. Have students label each inside corner of the rectangle with the name of one game (as shown on Handout 3).

> **Note:** Depending on your class size, you may have a team with more (or fewer) than four students. In that case, have the team draw a shape that corresponds to the number of team members—i.e., a triangle for a three-member team or a pentagon for a five-member team.

Tell teams to identify the elements that are common to all of the games played and to record those elements inside their rectangle. Have students record each game's distinct features on the corresponding outside corner of the rectangle (as shown on Handout 3).

4. Discuss common elements and distinct features of games.
Have each team share with the class its list of common game elements. Then have teams share some of their games' distinct features.

Teacher's Notes: Common Elements and Distinct Features

Students' lists may include the following elements and features.

Common Elements

- Involve players
- Have rules
- Have an objective—players are trying to achieve something
- There are challenges/obstacles/conflicts that make it difficult for players to achieve their objective
- Players compete against each other or against the game system
- Players have resources that they use to meet their objectives
- Include some degree of randomness or chance
- Involve decision-making on the part of players

Distinct Features

- Game platforms vary—for example, the platform could be a board game, card game, or video game; within video games, platforms include computer-based games, hand-held games, and console games
- Specific objectives vary—for example, players in the game might:
  - race to the end
  - chase or evade someone or something
  - solve a puzzle
  - build or destroy something
  - collect items
- Some games may involve a story and/or characters
- Some games rely on luck or chance, while others use strategy
- The player configuration varies: how many players, who competes against whom
- Competitive vs. cooperative: Most games are competitive, but some might involve collaboration instead of having a victory condition

Teacher's Notes: Discussing Video Games vs. Traditional Games

One obvious difference that students may notice is that some games are video games while others are not. Tell students that although they will develop an idea for their own new video game in this unit, they will also play and analyze other types of games, such as board games, card games, and physical-skill games.

Ask students why they think analyzing traditional games may help them become good video game designers. Point out that all games have some common elements that make them fun to play. Explain that when developing a video game, it's tempting to concentrate on special effects and graphics, but the core of any successful video game rests on game-play mechanics that are functional and fun to play.

5. Introduce the terms *formal elements* and *dramatic elements*.
Tell students that some of the common elements and distinct features they identified comprise games' *formal* and *dramatic elements.*

Distribute **Handout 4: Elements of Games**. Tell students that they will use this handout to structure their work for the whole unit. When they reverse-design a game in Part 2, they will "unpack" the formal and dramatic elements of the game. Similarly, when they design their own game, they will determine and design its formal and dramatic elements.

6. Analyze the formal and dramatic elements of one game.
Choose one of the games that students played, and use it as an example to point out different game elements. As a class, go through each element listed on Handout 4 and ask students to apply the definitions given to the sample game.

Teacher's Notes: Sample Game Analysis of *Super Mario Galaxy* for Nintendo Wii, Honeyhive Galaxy, "Bee Mario Takes Flight" Level

Formal Elements

Players: *Super Mario Galaxy* can be played by one or two players. Two players can play the game cooperatively, with one player controlling the character Mario and the other player collecting star bits and shooting them at enemies.

Objectives: The objective of this level is to find the Power Star while avoiding enemies and collecting coins and star bits.

Rules: There are many rules. Here are some examples:

- If Mario is damaged three times by enemies, he "dies" and the player loses one life.
- The Star Pointer (controlled by pointing the Wii remote) can collect star bits by pointing at them.
- Every time 50 star bits have been collected on a level, the player gets an extra life.
- When Mario is wearing a bee suit, he can "fly" for a certain amount of time before he needs to recharge.

Resources:

- Players collect star bits to shoot at enemies.
- Coins can be used to restore Mario's health if he has been damaged. Like star bits, if enough coins are collected on a certain level, the player gets an extra life.
- "One up" mushrooms also give the player an extra life. There are several different power-ups throughout the game. In the Honeyhive Galaxy, there is a mushroom that gives Mario a bee suit, which allows him to fly and climb special walls.

Conflict: Various types of conflicts present obstacles that prevent players from achieving their objectives, for example:

- Opponents, in the form of enemies that try to hurt or kill Mario, such as Goombas and Piranaha flowers
- Physical obstacles, such as large boulders that roll on the ground or walls that Mario must find a way over

Players must also solve dilemmas. For example, in this level the player must figure out how to use the powers of the bee suit to help Mario reach the Queen Bee.

Dramatic Elements

Challenge: Players encounter a variety of challenging tasks, such as figuring out how to:

- defeat or avoid enemies
- move among obstacles to reach a goal
- use Mario's powers to solve a puzzle or problem

Players stay engaged with the game because the challenges can vary greatly from galaxy to galaxy. However, the game isn't too difficult for novice gamers.

Play: The game is playful and enjoyable because of its wide variety of environments and challenges. This unending variety encourages the player to keep playing after completing a galaxy level because he or she can look forward to new surprises.

The game play is innovative as well. For example, the game takes advantage of the Wii remote by creating a new "spin" move in which the player must twist the remote in a certain way. Many of the challenges (such as using the bee suit to climb a wall) are also fun to play and watch.

Premise and Story: The premise is that Princess Peach has been kidnapped by the evil Bowser. Mario's goal is to find and rescue the princess. The story provides the background and the rationale for the tasks that Mario performs during the game. However, the story is more of a background element than a prominent feature of the game—the storyline doesn't change based on game play.

Characters: The primary character, and the role taken on by the player, is Mario. Mario is a simple character without an extensive backstory. He is motivated by his drive to save the princess. Other characters in the game serve mainly to provide the player with information, rather than to enrich the experience of the game.

7. Discuss game objectives.
Point out to students that the game objective is one of the most important defining aspects of a video game. Tell students to keep this in mind as they design their own game.

Review the list of objectives given on Handout 4 and ask students to name examples of video games (or non-video games) that illustrate each objective. Ask students whether they can think of any games that have an objective not included in the list.

Teacher's Notes: Objectives and Genres

Video games are often classified by genre, such as action games or puzzle games. Games within the same genre often have similar objectives, since objectives define the essence of the game. If you would like to use genres to help students differentiate particular games, refer to **Appendix B: Video Game Genres.**

Have students reflect on game objectives by completing Journal 2.

Journal 2

List three of your favorite games. Name the objective, or objectives, of each game. Are there any similarities in these games?

Based on the games' objectives, try to define the type of game that has the most appeal for you. What do you think that indicates about your personality, interests, or skills?

Note: This point in the unit is a good place to have students complete Design Challenge #1. See **Appendix C: Game Design Challenges.**

Handout 4:
Elements of Games

A *game* is an activity or form of play that has structure, boundaries, and rules. Understanding the elements of games can help you design a game that is engaging and fun to play. Game elements include *formal elements*—the components that structure the game—and *dramatic elements*—the ways in which a game attracts and engages players.

Formal Elements of Games

Players

For a game to be a game, there must be someone who plays it! Games vary in the number of players, the roles that players take on, and the *player interaction patterns*—for example:

- A single player vs. the game
- Player vs. player
- Multiple players vs. the game

In cooperative games, players work together instead of competing against each other.

New Super Mario Bros. Wii can be played in single-player mode or in multiplayer mode as shown here.
Screenshot from *New Super Mario Bros. Wii* by Nintendo.

Objectives

What is the player trying to do or accomplish during the game? The objective of the game defines what the game is about.

Here are some common objectives in video games:

- **Arrange or align:** Arrange your game pieces in a particular configuration (such as in *Tetris* or *Bejeweled*)
- **Capture:** Take or destroy something belonging to an opponent (for example, terrain or units) while avoiding being captured
- **Chase:** Catch an opponent and/or avoid being caught yourself
- **Collect:** Acquire units or objects
- **Construct:** Build, maintain, or manage objects
- **Explore:** Explore game areas (this is usually combined with a more competitive objective)
- **Race to the finish:** Reach a goal—physical or conceptual—before other players reach it, or before time runs out
- **Rescue or escape:** Get someone or something to safety
- **Solve a puzzle:** Find a solution to a puzzle or problem more quickly or more accurately than a competitor

In *Bejeweled*, the objective is to arrange jewels so that three or more of the same jewel are lined up in a row. Screenshot of *Bejeweled 2* by Popcap.

Rules

Rules tell players what they can and cannot do in a game.
There are different kinds of rules in games. A rule might tell you . . .

- **What something means:** For example, a rule in the game of poker is that a *flush* consists of five cards of the same suit and that it is worth more than a *straight*, which consists of five cards in consecutive order.
- **What you can't do:** For example, one rule in *Madden Football* is that you can't throw the ball when you are past the line of scrimmage.
- **What happens if you do "X":** For example, in *You Don't Know Jack*, if a player answers a question incorrectly, the other players get a chance to answer.

Resources

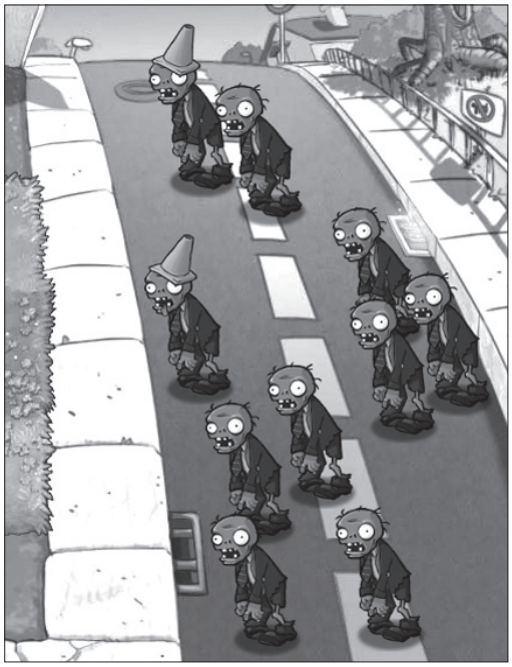
Resources are tools that players use to play the game and accomplish their objectives. In video games, resources might include the following:

- **Lives:** Some video games—including the earliest games, such as *Space Invaders*—give players a certain number of times they can "die" before the game is over. In many games, you can earn more lives if you do something well.
- **Power-ups:** These are generally objects that give your character some kind of boost of strength, power, wealth, or speed. For example, in *Jak* and *Daxter*, a type of power source called *blue eco* allows players to move faster than normal.
- **Inventory:** Some games allow players to collect objects (that are not power-ups), such as weapons and ammunition.
- **Currency:** In some games, players have money, gold, or another item that can be used to trade or purchase other resources.

Conflict

Conflicts are built into games in order to make it difficult for players to accomplish their objective. Conflicts provide a sense of competition and play.

Think of the game of basketball. What's the objective? To shoot the ball into the other team's hoop and score points. If the other team had no defenders, it would be easy for players to accomplish their objective. It would also be a boring game to play.



In the game *Plants vs. Zombies*, zombies are a source of conflict.
Screenshot from *Plants vs. Zombies* by Popcap.

Some common sources of conflict:

- **Obstacles:** Obstacles can be physical, such as a barrier blocking an entrance, or they can involve mental skills, such as a riddle you must solve or a code you must figure out in order to open a gate.
- **Opponents:** In multi-player games, opponents are players you compete against. In single-player games, there can be non-player characters that are opponents as well, such as enemies that you have to avoid.
- **Dilemmas:** Decisions that players must make in a game can provide conflict, such as deciding whether or not to fold during a poker game.
- **Time:** In some games, you work against the clock to reach a goal. The time pressure makes the game challenging and adds a level of tension.

Dramatic Elements of Games

The formal elements are what make a game a game. Dramatic elements are what make a game *fun*. A game's dramatic elements engage players and get them emotionally invested.

Challenge

In games, *challenge* refers to tasks that are satisfying to complete because they require the "right" amount of hard work. Challenges are tasks that engage you and make you want to continue playing so that you feel satisfaction and a sense of accomplishment.

Here are some points to keep in mind about challenge in games:

- If a game is too challenging, players can get frustrated—but if a game is too easy, players can get bored.
- The "right" amount of hard work depends on the specific player's skills and interests. For example, a child who is just learning to count might be satisfied with the challenge presented in the game *Chutes and Ladders*, while an adult who has mastered that skill would find it boring.
- When you design your game, you should have a target audience in mind so that you have a sense of how challenging your game should be.

Play

A main reason that people play games is because the simple act of *playing* something is fun. The word *play* often refers to activities that people choose to take part in for their own enjoyment (as opposed to *work*, which is something they have to do).

If you have watched small children playing, you may have seen them laughing with delight as they freely explore and experiment with objects, sounds, and activities. To really engage players in your game means structuring your game so that players feel a sense of play. You want players to feel that reaching the objective is fun, not work!

Premise and Story

Many games have a premise and story that provides context for the game and gives the player a purpose. There are different ways to approach the use of premise in a game, for example:

- Some games have an elaborate premise that provides drama for the player. For example, in *Diablo*, the player is a wandering warrior who has been asked by the townspeople of Tristram to help them rid the world of Diablo, the Lord of Terror.
- In other games, the premise is less developed. For example, the premise of *Space Invaders* is that you are protecting an unnamed planet from attacking aliens.
- In many puzzle games and other abstract games, there is no premise—at least none that is obvious to the player.

In most Mario series games, including *Super Mario Galaxy,* the basic premise is very simple: Princess Peach has been captured by Bowser, and Mario must save her.
Screenshot from *Super Mario Galaxy* by Nintendo.

Characters

Game designers aim to have players identify with a character in a game so that players become invested in the story and its outcome. Early video game characters were completely defined by the way they looked. Today, as games gain more sophisticated narratives, many characters have well-developed backstories that make the game a richer experience.

Activity 1A.3: The Weekly Critique

Distribute **Handout 5: Weekly Critique** and **Assessment Checklist 1: Weekly Critique.**

Explain that students will play games on their own (or with other classmates) outside of class each week and write a critique of each game they play, using the questions on Handout 5. Explain that after each critique, students should fill out the Student Comments portion of the Assessment Checklist.

Point out the different kinds of games recommended for critique on Handout 5—board games, card games, physical-skill games, and video games. If you created one, provide students with the list of links to online video games.

Discuss the different components of the critique on Handout 5: description, analysis and interpretation, and critique.

> **Note:** The critique is loosely based on the Feldman method of art criticism. For more information about the Feldman method, see *D/M/A Foundations in Visual Arts, Unit 1: Getting to Know You.*

Teacher's Notes: Weekly Critique

If students have taken *Foundations in Media and Digital Design: Animation and Game Design, Unit 1: The Animated World*, they should have experience with weekly critiques. If students need additional support, critique one game together as a class. A sample critique of *Plants vs. Zombies* is included in the teacher's version of Handout 5.

Logistics

If students do not have access to video games outside of class, you can have them play games during class. Note that playing games in class will add additional time to the unit.

Students can work together to play games for the weekly critique (especially board games, which usually require more than one player), but each student should write his or her own critique.

Critique Check-Ins

Schedule one or two check-ins during the unit in which students can discuss their critiques. Collect and review students' written critiques and assessments after each check-in.

Handout 5:
Weekly Critique

Choose a game to watch, analyze, and critique on your own each week.

Choose Games

Choose a game to play. You can play:

- board games
- card games
- physical-skill games (such as basketball or tag)
- video games

Critiquing a variety of games will help you see how different game elements work together to create a satisfying game, and how various types of games are similar and different.

At least three of the games you critique should be video games. Try to play games from different genres (for example, you might play a racing game, a role-playing game, and a *platform game*—a game in which characters jump on and over objects and platforms, such as the *Super Mario* game series).

Play the game for at least 15 minutes (if it's a multi-player game, play it with classmates, family members, or friends). Ideally, you will play at least one full level of the game (for a video game) or one round (for a board game or card game).

Describe, Analyze, Critique

Fill out the charts below for each game. You can include drawings as well as text—for example, you might sketch a character or an obstacle from the game.

THE GAME	
Name of the game	***Plants vs. Zombies***
Kind of game (for example, board game or video game)	***Video game***
Portion of the game that you played (for example, "the first level of the game" or "two rounds of the game")	***Levels 1-1 to 1-5***
Date and time you played the game	
Who you played the game with (if it's a multi-player game)	***Single-player game***

DESCRIPTION	
What is the objective of the game?	*To protect your house from zombies by planting plants that kill the zombies on the front lawn of the house.*
Describe two or more rules of the game.	*Specific amounts of sunshine can be used to buy plants (e.g., 50 units of sunshine for sunflowers, 100 units for peashooters).* *Only one plant can be planted per square of lawn.* *After a plant has been bought, it takes a certain amount of time to "recharge" before it can be purchased again.* *Zombies need to be hit by a certain number of peas from a peashooter before they die. If the zombies are protected by something they are wearing (such as traffic cones on their heads), the number of peas needed to kill the zombie increases.*
What does the *game world* (the physical environment of the game) look like?	*The game takes place on a green lawn, edged by lawnmowers on the west (house) side, a fence on the north side, and stones or a pathway on the east and south sides. There are between one and five strips of lawn, depending on the level, each of which has nine squares. The zombies attack from the east, moving west over the lawn. The house isn't seen in the game unless the zombies succeed in getting into it.*

ANALYSIS AND INTERPRETATION	
What resources can the player use to help reach the goal? What obstacles get in the way of reaching the goal?	*Resources: The player uses sunshine—which falls from the sky and is produced by sunflowers—as a form of currency to buy plants, such as peashooters and cherry bombs, which kill zombies (currency is also used to buy sunflowers).* *Obstacles: Zombies are constantly attacking the lawn; some zombies have properties (such as traffic cones on their heads) that make them more difficult to kill.*
Describe the style that artists have used to create the game world, and how it contributes to the mood of the game.	*The game world and characters are rendered in a simplified, cartoonish style, with bright colors and simple shapes. The style contributes to the game's humorous mood. For example, the eyes of the zombies are comically large.*
For a video game, describe an aspect of the game in which the game artists use the elements of art and principles of design to create a mood or create an engaging world for the player.	*The artists use contrast and color to create a mood by using bright primary colors for the plants and lawn and darker grays and blacks for the zombies. This makes the zombies seem menacing and clearly indicates that they are the "bad guys."*

CRITIQUE	
Did the game have the appropriate level of challenge (not too easy and not too hard)? If so, how did the game makers use game elements to create the right degree of challenge? If not, what aspects of the game weren't challenging enough or were too challenging?	*The game has an appropriate level of challenge. The game makers created this level of challenge by including fewer elements in the first few levels of the game (for example, starting out with only one strip of lawn, one kind of plant, and very few zombies), and gradually introducing more elements as the player begins to get a sense of how the game works.*
Was the game fun to play? Why or why not?	*The game is fun to play because the concept of the game is engaging, the game is funny and well-designed, the levels are relatively short and therefore immediately rewarding, and at the end of each level the player is introduced to a new element (such as a new plant), so there's always something new to look forward to.*
Describe one thing you would change about the game and why.	*One possible answer is that there could be more plants available for players in the early levels of the game, to make the game more interesting for players who quickly pick up on the concept of the game.*

Assessment Checklist 1:
Weekly Critique

Use this checklist to help you plan and assess each of your weekly critiques. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Description		**Student Comments**	**Teacher Comments**
Clearly describes the objective of the game.	**10%**		
Describes at least two rules of the game.	**10%**		
Clearly describes the world of the game.	**10%**		
Analysis and Interpretation			
Clearly describes resources players can use to reach the goal, and obstacles that get in the way of the goal.	**15%**		
Describes the style in which the game is rendered and how it contributes to the game's mood.	**10%**		
Demonstrates understanding of the elements of art and principles of design by describing how they are used to create a mood or an engaging world.	**10%**		

Critique			
Provides convincing evidence for why the game did or did not have the appropriate level of challenge for players.	**15%**		
Identifies reasons that the game was or was not fun to play.	**10%**		
Identifies convincing reasons that one element of the game should be changed.	**10%**		
Total	**100%**		

Activity 1B:
Exploring Game Development Software

Students learn about the software they will use to create the game for their unit project, and create a simple game.

Materials Needed

- Computers (ideally, one for each student, although students can also work in pairs)
- Game development software
- Optional: Tutorials, instruction manuals, or handouts about the game development software
- **Handout 6: Game Development Worksheet**
- Optional: File of the game that you developed (see *Advance Preparation)*

Advance Preparation

RESOURCES

- Optional: Look at tutorials or introductory activities designed by software developers or others to introduce specific game development software to users (see *Media & Resources* for suggestions). Determine which, if any, of these tutorials or activities you will complete with students. Note that these activities may add additional time to the unit.
- Determine the objective of the game that students will create in order to familiarize themselves with the game development software. Here are some options:
  - Moving a character or object from one part of a space to another to reach a goal
  - Moving a character around a wall or barrier to reach a goal
  - Having a character collect one or more resources (such as coins or apples)
  - Having a character shoot one or more enemies
  - Having the player collect objects (moving or not moving) by clicking on them
  - Have the player avoid an enemy for a set amount of time
- Optional: Use the game development software to create a game like the ones students will create. (This way, students can see the game code or what a correctly working game should look like.)

1. Optional: Lead students through tutorials or introductory activities.
If you are having students complete introductory tutorials or activities, walk them through the activities, using the tutorials, instruction manuals, or handouts that you have gathered.

> **Note:** If you are using Gamestar Mechanic, this is a good point to have students complete the "quest" that must be finished before students create their own games. The quest teaches students how to use Gamestar Mechanic to create games, and introduces some of the principles of creating good games.

2. Teach students the skills they'll need to use to create their simple game.
If they have not seen it already, show students the development interface, and introduce them to the concepts and basic skills they will need to create a simple game. These will vary depending on the game development software that you use and what students have already learned if they completed tutorials or activities in Step 1. Some possibilities include the following:

- Using the software's programming language or visual user interface
- Using event-driven programming
- Using "If . . . then . . . " constructs in programming
- Adding assets or resources, such as images and sounds
- Defining or creating the room, world, or space in which the game takes place
- Orienting objects on an *xy*-axis
- Adding programmable objects to the game space
- Defining actions that are triggered by events (for example, having an object move when a keyboard button is pressed)
- Creating scripts for specific objects in the game
- Determining how user inputs affect the game
- Determining how the game ends when the player wins or loses

3. Go over the objective of the game students will create.
Describe to students the objective of their simple game. Distribute **Handout 6: Game Development Worksheet,** and have students take notes on the worksheet as they think about how they will program their games.

> **Note:** Not all of the questions on Handout 6 will apply to students' simple game. Students will use this worksheet again when they create their game for the unit project.

4. Have students create simple games.
Have students work individually or in pairs to create their games. Provide support and troubleshooting as students use the software. If you have created a version of the game, you can share that file with students so they can see the code.

Teacher's Notes: Creating a Game as a Class

Another option, rather than just share the code of a game you create with students, is to have the class create a game together before students create their own games. If you choose this option, you may still want to create a sample game ahead of time so you know what the code should look like in a working version of the game.

Encourage students to play-test their games frequently as they work on them, as play-testing is the best way to discover potential problems.

Note: Students' simple games provide a good opportunity for formative assessment.

5. Have students share their games with the class.
Ask a few volunteers to play their game for the class.
Ask students:

- What surprised you about the game development process?
- What did you find challenging about the process?
- What did you find enjoyable about the process?

6. Brainstorm a list of limitations imposed by the software.
Explain to students that they will use the software program to create a game of their own design for the unit project. Ask students to brainstorm a list of limitations that the software will put on the games they create.

Possible answers: *Depending on the software program, limitations might include the following:*

- *Whether the game is 2-D or 3-D*
- *The visual perspective of the game*
- *The kinds of objects and characters that can be used in the game*
- *The kinds of goals players can have*
- *The way that the player interacts with the game (the manual interface)*
- *The information that the player sees (the visual interface)*

Tell students that when they develop their game ideas later in the unit, they will need to keep these limitations in mind in order to design a game that they can actually build.

Handout 6:
Game Development Worksheet

As you work on developing your game, use the questions on this worksheet to take notes and organize your work. Depending on the game you are creating and the game development software you are using, not all of the questions may apply.

Player Experience

- What role does the player take on in the game? How is the player represented—by a player-controlled avatar, or another means?

- What is the player's objective?

- What types of actions can the player take in the game? If there are player-controlled avatars, how does the player move the character?

- How does the player cause things to happen in the game? What keys or other controls do they use?

Game World

- What will your world look like? What are the boundaries of the world?

- Are there walls or other terrain features in your world? How will you represent these features? What objects will you use? What properties will those objects have?

Other Characters in the Game

- Are there characters that move around in the game world, such as enemies? If so, how will those characters be represented in the game?

- If there are enemies, how will you program their movement?

Resources in the Game

- What resources (such as coins or food) do players use to achieve their objective? How will they be represented in the game?

- What happens when the player interacts with those resources (for example, by clicking on them or by having an avatar touch them)?

Scoring/Winning/Losing

- Is there a scoring system in the game? If so, how does the player lose or gain points? How does the player know what his or her score is?

- Is there a timing system in the game, such as a clock that the player must beat? If so, how does the timing system function, and how is it represented?

- How does the player win the game? What happens when the player wins?

- How does the player lose the game? What happens when the player loses?

Part 2: Reverse Design

Students choose an existing video game, work backward to understand its different design elements, and complete a reverse-design document for their chosen game. By "unpacking" the components of an existing game, students gain an understanding of game design that they will use to plan their own games later in the unit.

Length

5 50-minute sessions

Activity 2A: Introduction to Reverse Design

Students are introduced to the reverse-design project and work in teams to choose and analyze a video game. Students complete a reverse-design document of the game's formal and dramatic elements. Teams identify strengths and weaknesses of the game and share their findings with the class.

Materials Needed

- **Handout 7: Reverse-Design Document**
- Video games for reverse-design project (see *Advance Preparation*)
- **Students' copies of Handout 4: Elements of Games**

Advance Preparation

- In Activity 2A, students choose a video game to play and analyze for their reverse-design project. Select an assortment of games in advance for students to choose from. Decide whether your selection will include console and hand-held games, online games, user-generated games, or a combination. Some options:
  - Collect or have students bring in a variety of console and hand-held video games.
  - See *Media & Resources* for links to online video games.
  - If your students are using game development software (such as *Gamestar Mechanic* or *Scratch*) that provides access to games created by other users, you may want to select examples of these games for students to choose from.

  Be sure to check the games for appropriate content.

1. Introduce the reverse-design project.
Divide the class into teams of three or four. Tell students that they are going to work in teams to choose and analyze one video game. Explain that by unpacking the design elements of the game, they'll gain an understanding of how games are designed. They can use this information to help them plan their own games later in the unit.

Distribute **Handout 7: Reverse-Design Document** and go over each category with the students.

> **Note:** Some categories may not apply to students' chosen game. In those cases, have students make adjustments to the handout as needed.

2. Have teams choose a game to analyze.
Have students choose from the video games that you selected. Tell them to choose games that are:

- available to play during class time
- fun to play (since they'll be spending quite a bit of time playing them)

Make sure that each team's game choice is practical—i.e., students need to have access to their game and be able to play it during class.

3. Have students play their chosen game.
Have team members play their game—several times, if necessary. Give them enough time to familiarize themselves with the rules and procedures of the game. Encourage students to take notes about the game elements categorized on Handout 7.

4. Have students complete Parts 1–3 of the handout.
Give teams time to complete Parts 1–3 of Handout 7. Tell students that they can refer to **Handout 4: Elements of Games** as they do their analysis. Explain that students will complete Part 4 of Handout 7 as a separate step.

> **Note:** You can have students work together as a team to complete Handout 7 or have team members assign parts and categories to complete individually. If students work individually, make sure that you provide time for them to share and synthesize their individual work with the team.

> **Note:** Handout 7 provides a good opportunity for formative assessment.

5. Have students identify a strength and a weakness of their game.
Have team members discuss their game's elements and choose an element that is a strength of the game. For example, the game play may be especially fun because it has the appropriate level of challenge or an engaging game world.

Then have students choose a game weakness. For example, the game's rules might be confusing or the game's great number of obstacles might make it too challenging.

Teacher's Notes: Guiding Questions

You may want to provide guidance to help students identify their game's main strength and weakness. For example, students might ask themselves:

- Is the game easy to understand? Why or why not?
- Does the game provide enough challenge? Too much challenge?
- What makes the game fun to play?
- Does the game art help to convey an appropriate mood?

6. Have each team share its game's strength and weakness with the class.
Have each team describe its game's strong point and weakness.

> **Note:** Students will discuss the strengths and weaknesses of their game's user interface in Activity 2B, so have them focus on other elements of their game in this discussion.

Discuss with students what they learned about principles of game design when they analyzed their game and completed Parts 1–3 of the reverse-design document.

> **Note:** This is a good place to have students complete Design Challenge #2. See **Appendix C: Game Design Challenges**.

Handout 7:
Reverse-Design Document

Use this document to help you unpack and record the design elements of the game your team has chosen to analyze.

Part 1. Overview	
Briefly describe the game and how it is played. Include a short description of the *game world*—the physical world in which the game takes place.	
Part 2. Formal Elements	
Players	
How many players play the game? What is the player interaction pattern (for example, player vs. game)? What role does the player (or do players) take on during the game?	
Objective(s)	
What does the player try to achieve during the game? (If there are multiple objectives, list them and indicate which is the game's main objective.)	
Resources	
What do players use to help them accomplish their objectives (for example, weapons, currency, special powers)?	

Conflicts and Obstacles	
What obstacles make it challenging for a player to accomplish his or her objective(s) (for example, enemies, limited amount of time)?	
Rules	
List three to five rules that you identify in the game. Include different types of rules. (For example, are there rules that restrict actions a player can take? Rules that define how a player can use a particular object in the game?)	

Part 3. Dramatic Elements

Challenge	
What's challenging about the game? What's easy about the game? Does the game have the right level of challenge (not too easy and not too hard)? If so, how did the game makers use game elements to create the right degree of challenge (for example, by limiting the time available to get through a level)? If not, what aspects of the game weren't challenging enough or were too challenging?	

Play	
What activities do players do that make the game fun?	
Premise and Story	
If the game tells a story, briefly describe the story. How, if at all, do player actions affect the outcome of the story?	
Visual Art Style	
Describe the visual style of the game (for example, is the game realistic-looking? Dark and gritty? Cartoon-like? Influenced by anime?). Describe the game's mood and how the art style helps to establish this mood.	

Part 4. User Interface

Manual Interface	
How do you control the game? Describe how to complete two actions in the game (such as movement or shooting). How easy or difficult is it to use the manual interface? Why?	

Visual Interface	
Describe or sketch the visual interface. What is the camera viewpoint? Where is information displayed on the screen? Is the visual interface easy or difficult to navigate? Why?	
Information	
What information is displayed onscreen for the player? Does the visual interface show the right kind and amount of information? If not, what should be added or removed?	

Activity 2B: User Interface

Students play video games that have different types of interfaces. They brainstorm a list of qualities of successful interface design.

Materials Needed

- **Handout 8: User Interface**
- Several video games (see *Advance Preparation*)
- Stopwatches (one for each team) or a clock with a second hand
- Optional: Digital cameras
- Students' partially completed copies of **Handout 7: Reverse-Design Document**
- The video games teams reverse-designed during Activity 2A

Advance Preparation

- In this activity, students analyze games' user interfaces. Select several different video games for students to play and analyze. Try to choose a variety of game genres and platforms so that students can get a sense of different types of game systems and controls. You can use games students have looked at already (such as games played during Activity 1A).

1. Discuss the term *interface*.
Ask students to describe different interfaces they have used in video games.

Teacher's Notes: Defining *Interface*

Interface refers to how the player and the game interact. Specifically, it refers to how information and actions are communicated and displayed by the player and the game. The interface includes the manual controls that the player physically touches, as well as the information displayed on the screen and the format in which it is displayed.

Interface design is challenging because it combines elements of game play—such as determining the decisions a player is allowed to make and the consequences of those decisions—with elements of visual design—such as how information and actions look on the screen and the degree to which the information is integrated into the game world.

Distribute **Handout 8: User Interface** and tell students that they will refer to this handout throughout the activity. Point out that they will also use Handout 8 to help them complete Part 4 of **Handout 7: Reverse-Design Document** and for their unit project.

2. Have teams play a game and list decisions and actions taken by the player.
Divide students into small teams. Assign each team one of the games you selected.

Have a team member start the game and play it for exactly one minute, while the rest of the team observes. One of the observing team members should keep the time with a stopwatch or by watching a clock with a second hand.

> **Note:** Depending on the game, students may need time to configure the game, select characters, etc., before beginning the 60 seconds of game play.

Have the observing students list all the decisions and actions made by the player during the 60 seconds of game play.

> **Note:** You can also do this as a whole-class analysis by having one team play a game while the rest of the class observes.

3. Have students share the decisions and actions taken by players.
Ask students what actions and decisions their team player made during the 60 seconds of game play.

> ***Possible answers:*** *Depending on the games played, the actions and decisions might include the following:*
>
> - *Moving a character along a route*
> - *Changing direction or speed*
> - *Picking something up*
> - *Shooting or attacking something*
> - *Accessing a tutorial*

4. Discuss player controls and communication methods.
Ask students to share the ways in which players communicated their actions to the game (for example, using a joystick to move a character, or moving a mouse to click on different objects).

Have students look at the Manual Interface section on Handout 8 and compare the controls used in their game with the controls listed on the handout.

Ask student players what they liked and didn't like about the manual controls in the game they just played, and why.

> ***Possible answer:*** *Students may find some controls more intuitive or more responsive than others.*

5. Have students play the game again and analyze the visual interface.
Tell teams to play their assigned game a second time. This time, they should choose one moment in the game and pause the game so they have a frozen screen to look at.

> **Note:** When some games are paused, a menu or other items appear on the screen. To avoid this, you can have students use digital cameras to take a picture of the desired screen instead of pausing the game.

Ask students to discuss the following questions in their teams:

- What do you see on the screen you froze?
- From what viewpoint is the game world shown? (For example, is it an aerial view? A first-person perspective?)
- What information is provided on the screen?

6. Have students share their observations of visual interfaces.
Ask students to share the information that was given on their frozen screens.

> ***Possible answers:*** *Depending on the types of games played, the information on the screen might include the game score, player status, health of the player (such as percentage of strength left), and time remaining.*

If possible, have students look at the different screens that each team analyzed and make note of the similarities and differences among the visual interfaces. Ask:

- Why might the game designers have made different decisions about visual interfaces for each game?

Now have students look at the Visual Interface section of Handout 8. Ask:

- How did the visual interfaces in the games you played compare to the visual interfaces described on Handout 8?

Teacher's Notes: Differences in Visual Interfaces Among Games

Viewpoint
Students may notice that the games have different camera viewpoints. The designer of a game with a first-person viewpoint may have been trying to create a sense of empathy or drama. A sports game or other game that depends on a more detailed control of the character might use a side view.

Interface Style
Games might also differ in the extent to which the interface is integrated into the game world:

- A game might use a split screen, with a menu list of controls at the bottom. Students might note that the designer's goal in that case is to make clear to the player what the options for action are.
- Other games may have a whole-screen interface, in which the player moves the cursor around the screen and clicks on things of interest. Students might note that this kind of interface is intended to immerse the player in the game world.

7. Discuss qualities of successful and unsuccessful interfaces.
Have students share what they liked and didn't like about their game's interface. Record a class list of qualities of successful and unsuccessful manual and visual interfaces.

Teacher's Notes: Interface Qualities

Qualities of Successful Interfaces

- Intuitive controls
- Clear and obvious to the player how to communicate actions
- Responsive
- Style of interface matches style of the game

Qualities of Unsuccessful Interfaces

- Confusing or cryptic—has controls that are not intuitive
- Complex—provides too many options
- Too simplistic—limits player choice
- Inefficient—forces players to interact too many times with the interface before they get to their destination
- Cluttered—takes up too much screen space and obstructs the game content area

8. Have teams analyze the user interface of the game they are reverse-designing.
Have students meet in reverse-design teams to complete Part 4 of **Handout 7: Reverse-Design Document**, analyzing the user interface of the game they reverse-designed in Activity 2A.

Ask teams to answer the following questions about their game's user interface:

- What aspects of the game's user interface were successful? Why?
- What aspects of the game's user interface were unsuccessful? Why?
- If you were designing this game's user interface, what changes would you make?

Note: Handout 7 provides a good opportunity for formative assessment.

9. Have students complete Journal 3.

Journal 3

Think about all the games that you have played, analyzed, or seen in this class and at home. Which game's interface do you like the most? Why? Describe how the interface affects your enjoyment of a game.

Think about an idea you have for a new video game that you'd like to design. What kind of interface would work best for this game? Why?

Note: Journal 3 provides a good opportunity for formative assessment.

Note: This point is a good place to have students complete Design Challenge #3. See **Appendix C: Game Design Challenges**.

Handout 8:
User Interface

User interface refers to the way that players and the game interact. In video games, there is a *manual interface*—the controls that players manipulate physically (such as a joystick or keys on a computer keyboard)—and there is a *visual interface*—how information and actions are displayed on the screen.

Manual Interface (Controls)

The manual interfaces are closely associated with the particular game platform.

Computer Games

Players often navigate through a computer game using a combination of the computer's keyboard (especially the arrow keys) and the mouse. Players may also use other kinds of controls, such as joysticks or wands.

Console Games

Similar to arcade games, console games (such as the X-box and Wii) use controls, such as buttons, sticks, and pads, which respond quickly to touch. The controls are designed to respond to quick reflexes, and they handle action games better than computers do. Some specialized console games have unique devices, such as foot pads (*Dance Dance Revolution*), fishing rods (*Bass Fishing*), and guitars (*Guitar Hero*).

A guitar controller that can be used with the game *Guitar Hero*

A game console and remote

Hand-Held Games

Single-purpose hand-held games (such as the Nintendo DS) are like miniature console systems with their own screens. The manual controls are similar to those in console games, though smaller. With multi-purpose devices, such as those that combine games with cell phones, the interface design has to be flexible, so that the system can be used by a "player" sometimes and by a "caller" at other times.

Many games, like *Angry Birds*, are designed to be played on cell phones.

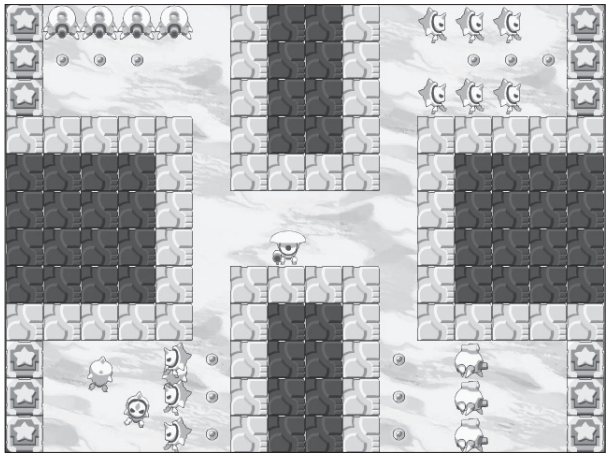
Visual Interface

What does the player see on the screen? The visual interface for a video game is a combination of the camera viewpoint of the game world and the visual display of information and controls that allows the user to interact with the system.

Camera Viewpoint

The camera viewpoint is the angle from which the player sees the game world.

Overhead (or "top-down") view: Early games, especially early sports games, used an overhead view that allowed the player to see the whole game world. Today, this viewpoint is used less often. (Imagine watching a movie that's shot from an aerial view—it's not the most natural way to look at something!)



This game developed in *Gamestar Mechanic* uses an overhead viewpoint.
Screenshot courtesy of E-Line Media.

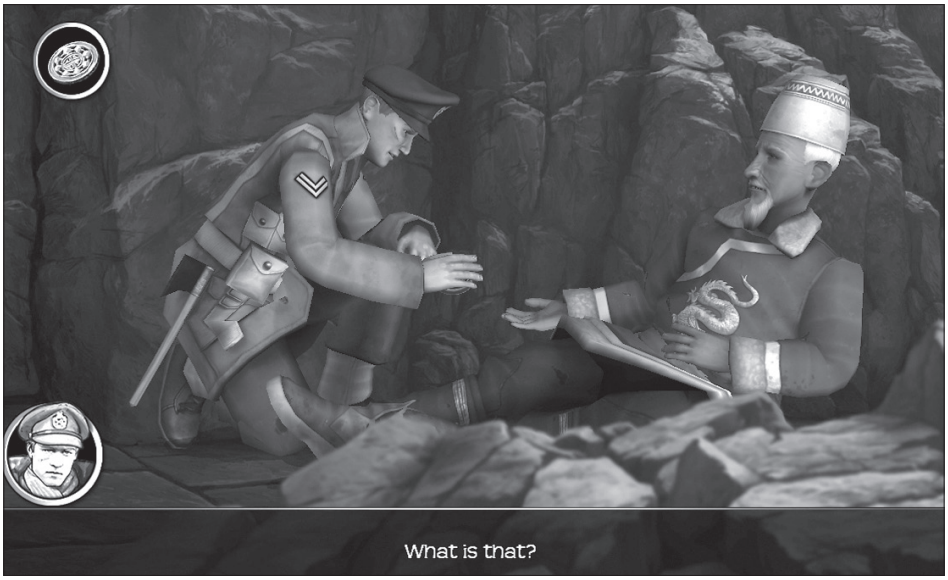
Isometric view: This viewpoint is essentially a fancier version of the overhead view. It uses graphics to give the appearance of three-dimensional perspective, which makes it look realistic.

Grave Shift uses an isometric viewpoint.
Screenshot from *Grave Shift* by Tangerine Pop.

First-person view: This viewpoint puts the player in the main character's shoes. It also limits the player's knowledge of the whole game world, allowing for dramatic moments of tension when an unexpected object or character, such as an enemy, jumps out from around a corner or behind a door. Today, the first-person view is common, creating a level of intimacy and immersion in the game world.

Nerf N-Strike Elite uses a first-person viewpoint.
Screenshot from *Nerf N-Strike Elite* by Electronic Arts, Inc.

Third-person view: This view often follows a character closely, but stops short of putting the player directly inside the character's shoes. Strictly speaking, top-down and isometric views are also third-person views, since they are from the viewpoint of an outsider looking in on the game. But in game design, a third-person view often shows the scene at eye level, like this one.



Lost Horizon uses a third-person viewpoint.
Screenshot from *Lost Horizon* by Animation Arts, published by Deep Silver.

Information and Action

The visual interface contains information that the player needs to access throughout the game. Sometimes this interface is active, which means that the player can interact with it by clicking on displayed items. For example, a player might see icons or buttons on the screen that allow the player to take the following actions:

- Pause a game or start a new game
- Save a game
- Configure the game
- Customize a character
- Choose a player mode
- Perform an action related to game play, such as picking up an object, opening a door, or moving a character

Players cannot interact with items displayed in a *passive* interface. These items might include the player's status—such as score, lives left, energy/strength, or time remaining. Most games' interfaces include both passive and active items.

Visual Interface Styles

There are different styles for displaying information and controls on the screen. For example, some games have a visual information display that is separate from the action in the game. This is intended to make it easy for the player to find the information and controls.

In *Mario Kart Wii*, pieces of visual information such as a map of the course and the player's position in the race are displayed on screen.
Screenshot from *Mario Kart Wii* by Nintendo.

In other games, the interface elements are integrated directly into the game world. For example, the player's health status may appear as lights on the player's armor or clothing or the amount of resources remaining may appear directly on the character's wallet or food bag. These whole-screen interfaces are designed to immerse the player more deeply in the game world.

Part 3:
Video Game Design and Development

Students work with their project teams to develop their video game idea, writing a treatment and creating a game design document. They build wireframes for the game, develop game art, and create the game. Paired teams engage in a round of play-testing, and teams refine their games based on feedback.

Length

25 50-minute sessions

Activity 3A: Concept Development

Students begin developing their video game idea.

Sequence

3A.1: Choosing a Game Idea	Students brainstorm ideas for their game. Teams discuss game ideas and choose one idea to develop.
3A.2: Writing a Treatment	Team members work together to write a short treatment of their video game. Teams share treatments with another team and then revise them based on the feedback they receive.

Materials Needed

- **Handout 9: Unit 2 Project Description**
- **Assessment Checklist 2: Unit Project—Game Design Document and Wireframes**
- **Handout 10: Giving and Receiving Feedback**

3A.1: Choosing a Game Idea



1. Introduce the unit project.
Divide the class into teams.

Teacher's Notes: Configuring Teams for the Unit Project

You can configure project teams in different ways, depending on the number of students in your class and the number of computers available. Ideally, teams of no more than two or at most three students will work together to develop and create their video game, but larger teams can work together on game design. If students work in pairs or as individuals, note that presentations will take substantially more time.

There are a number of options for team configuration:

- Teams of three students work on game design and development.
- Teams of four students work on game design. Teams divide into pairs, and each pair develops a game based on the design. Each team then presents its work as a team (rather than in pairs).
- Pairs of students work together on game design and development.
- Pairs of students work together on game design. Each student then develops a game based on that design.
- Individual students design and develop a game on their own.

Note that the last option requires each student to do more work and therefore may require more class time. Also, students who work individually will not benefit from brainstorming ideas with classmates.

Distribute **Handout 9: Unit 2 Project Description** and **Assessment Checklist 2: Unit Project—Game Design Document and Wireframes**.

> **Note:** Students will receive assessments related to the other components of the unit project later in the unit.

Tell students that for the unit project they will work in teams to come up with an idea for a new video game. They'll complete a design document, interface wireframes, and art for their game. They'll create the game and play-test it with their classmates.

Review the project steps on Handout 8 and answer any questions students may have.

2. Have students brainstorm game ideas.
Let students know about any limitations on their game designs (such as creating a specific type of game or creating only one level of a game), and remind students of the list of limitations of the game development software that the class created in Activity 1B. Tell students to keep these constraints and limitations in mind as they come up with game design ideas.

Teacher's Notes: Determining Types of Games for the Unit Project

Depending on the game development software students are using, there are several different kinds of games that they might develop. Students should not plan to design games that are too complex, have too many characters or objects to program, have many levels, or that are multiplayer.

Types of games that are feasible include games for which the objective is as follows:

- Collecting specific resources while navigating obstacles or avoiding enemies
- Navigating an obstacle course in a specific amount of time
- Defeating a certain number of enemies
- Protecting territory from damaging objects, (e.g., falling asteroids) by destroying the objects

Racing games in which players navigate an object around a track or a course within a specified time period are also another type of game that students might develop.

Have students individually complete Journal 4 to help them come up with ideas.

Journal 4

Game ideas can come from lots of different places. Complete the following prompts and use your responses to help you generate ideas to use as the basis for a new game.

- My favorite sports or games that I played outside when I was younger were . . .
- My favorite indoor games (board games, etc.) that I played when I was younger were . . .
- Right now, my favorite non-video games are . . .
- My favorite video games are . . .
- My favorite movies are . . .
- A TV show that I like is . . .
- A reality TV show that I like is . . .
- One of the best books I ever read was . . .

- One of the most fun things I ever did was . . .
  (This could be any experience you had, such as being in a play, winning a basketball game against a tough opponent, or going on a trip.)

Look through your list. Do any of the games or experiences that you've already had lend themselves to ideas for a new video game? Brainstorm two ideas for games, based on any of the prompts you answered above or a totally new idea. Be sure to keep in mind the limits of the game development software you're using, and focus on ideas that are simple enough to complete in the time that you have available.

Each of your ideas should answer two basic questions from the perspective of a player:

- Who are you?
- What do you do (or what are you trying to do) during the game?

Note: Journal 4 provides a good opportunity for formative assessment.

3. Have teams choose one game idea for their unit project.
Have students share their individual ideas from Journal 4 with their team. Tell teams to choose one idea, using the criteria in Step 1 of Handout 9 to help guide their decision-making process.

Teacher's Notes: Teamwork Skills

Since each team will choose just one idea, you may want to discuss strategies for making sure that each team member's voice is heard during the decision-making process and for voicing critiques respectfully.

For additional information on teamwork skills, refer to *Foundations in Visual Arts, Unit 3: Community Storytelling*, Activity 1A.5: Building Collective Responsibility as a Team.

Handout 9:
Unit 2 Project Description

How do video game developers come up with ideas for new games? What kind of game would you like to create? For the unit project, you'll explore these questions by taking on the role of a team member at a video game development company. Your task is to come up with an idea for a simple video game and then create the game.

Your game can be based on anything. You can adapt an existing video game, a board or card game, a sport—or you can create a totally new game!

You'll work as part of a team to design the game. You'll produce *wireframes* (sketches of game screens) for the game's visual interface, and you'll create game art. You'll use game development software to build your game, you'll test the game with classmates, and, finally, you'll present your idea to the class.

Step 1: Choose a Game Idea

Brainstorm game ideas on your own, and come up with two to share with your team. Each of your ideas should answer two basic questions from the perspective of a player:

- Who are you?
- What do you do (or what are you trying to do) during the game?

For example, are you an explorer searching for gold? A hero shooting at enemy aliens? A circle eating dots?

Because you will have a limited amount of time to create your game, the game should be fairly simple—you won't need an elaborate plotline, and you probably shouldn't plan on creating different levels. You should also take into account the limitations of the software program you're using (for example, don't plan a 3-D first-person shooter game if the software limits you to platform games) and any limits set by your teacher.

Share your ideas with your team and discuss the kind of player experience each idea offers. For example, will the player be using quick reflexes, navigating a maze, solving puzzles?

As a team, choose one game idea, using the following questions to guide you:

- Which ideas sound like the most fun to play?
- Which ideas offer the most engaging player experience?
- Which ideas are simple enough to be playable and practical to develop, but not so simple that they will be boring?
- Can this game be made with the software you're using?

Step 2: Write a Treatment

Write a short treatment that describes your team's game idea and answers the following questions:

- What role(s) does the player or players take on in the game?
- What is the objective of the game—what is the player trying to achieve?
- What does the player (or players) do during the game in order to achieve this objective?

Here is a sample treatment:

> *In* The Ghostly Maze*, an individual player navigates through a maze to collect apples while avoiding ghosts that travel through the maze. The player enters the maze and must collect all the apples there and reach the exit in a limited time period without being damaged too much by ghosts.*

Step 3: Get Feedback on Your Game Idea

Share your treatment with another team. Those team members will tell you how appealing your idea is, how much fun they think it will be, and how practical it will be to design it. They'll ask questions to help you think through the details of how your game will work.

Revise your treatment based on any feedback you get from the other team.

Step 4: Complete a Design Document

Work with your team to write a game design document that outlines the game.

This is a working document—keep in mind that you'll build your game and test it with classmates. You'll use their feedback to revise your document, along with the game.

Step 5: Create Wireframes

Sketch the manual and visual interface design for your game. How will players interact with the game? Create *wireframes*, or sketches of different screens in the game, that show how information will be displayed onscreen. Be sure to keep in mind the constraints of the software you're using when you sketch your wireframes.

Step 6: Create Game Art

Your teacher will tell you whether you'll create digital art that you will actually use in the game, such as images of characters and objects, or whether you'll create concept art, such as sketches of what the game world and its characters and objects might look like.

Decide how your game will look. What art style will you use—realistic, abstract, cartoon-like, or something else? Will you use bright colors or pastels? Think about how you want players to feel and how can you create visuals that bring about those feelings.

Step 7: Build Your Game

Use game development software to create a working version of your game.

Step 8: Play-Test Your Game

Have another team play your game and give you feedback. They'll help you answer key questions about your game, for example:

- Do the rules work?
- Can a player achieve his or her objectives?
- Are there significant challenges for players that make the game engaging?
- Does the game have the right level of challenge (not too hard and not too easy)?
- Is the game fun?

They'll also provide specific suggestions for improving the game.

Step 9: Revise Your Game

Revise your game based on your classmate's feedback. Detail any changes in your design document.

Step 10: Present Your Game

Develop a presentation. Include pieces of your game art and your design document, along with a game demonstration. Then present your game to the class and, possibly, AME professionals.

Assessment Checklist 2:
Unit Project—Game Design Document and Wireframes

Use this checklist to help you plan and assess your project. Make sure that you include all the required components. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Technical Knowledge and Skills		**Student Comments**	**Teacher Comments**
Game design document incorporates formal elements including objectives, resources, conflicts, and rules.	**15%**		
Game design document incorporates dramatic elements, including challenge, play, and story (if relevant).	**15%**		
Team creates at least two wireframes that depict a consistent and clear visual interface.	**10%**		
Content			
Game design document clearly describes the game idea and overall playing experience offered by the game.	**10%**		
Game design document clearly describes the game's manual and visual interface style and provides a rationale for interface design decisions.	**10%**		
Wireframes clearly show how players interact with the game, including how information and actions are communicated.	**10%**		

Creative Expression			
Game design document provides a compelling argument for how the game's dramatic elements will attract and engage players.	**10%**		
Game design document presents a compelling argument that the game will be fun to play.	**10%**		
Game design document presents a compelling argument that the game will have the appropriate degree of challenge.	**10%**		
Total	**100%**		

3A.2: Writing a Treatment

1. Have students write treatments for their game ideas.
Have students work in their teams to complete Step 2 of Handout 8 and write a treatment.

2. Have teams use the Critical Response Process to solicit feedback.
Tell students that they are going to pair up with another team and use the Critical Response Process to give and receive feedback on their treatments.

> **Note:** Students should be familiar with the Critical Response Process from *Unit 1: The Animated World*. For more information and a handout about the Critical Response Process, see pages 55 and 62 in Unit 1.

Have each team come up with several questions that the team would like feedback on. Tell students that they can also ask the other team for help in developing their game idea.

Teacher's Notes: Suggestions for Feedback Questions

You may want to have a class discussion about the type of feedback questions teams might ask. Point out that questions should be as specific as possible in order to get constructive feedback for improving game ideas. Students might ask, for example:

- Does the game seem as if it will be challenging enough to hold your attention, without being too challenging to complete? If not, can you think of ways to make it more challenging?
- Does the game seem like it would be fun to play?
- Do you have any ideas for additional conflicts and obstacles that would add challenge to the game?

Distribute **Handout 10: Giving and Receiving Feedback** to remind students of tips for giving and receiving constructive feedback.

> **Note:** This handout is similar to a handout students received during *Unit 1: The Animated World*.

Have teams give and receive feedback.

3. Have students revise their treatments.
Have teams revise their treatments based on the feedback they receive from their classmates.

> **Note:** If students receive feedback that their idea is not workable at all, they may need to choose a completely different idea. You might want to meet with these teams to discuss alternative game ideas.

> **Note:** Students' treatments are a good opportunity for formative assessment.

Handout 10:
Giving and Receiving Feedback

Throughout your unit project, you and your classmates will provide feedback on each other's work. Think about the best experiences you've had giving and receiving feedback with other students—how did the giver of feedback behave? How did the receiver of feedback behave? Here are some tips to keep in mind.

As a receiver of feedback:

- **Ask for specific help.** Tell members of the other team what you're having difficulty with and what issues you'd like feedback on.
- **Ask for clarification.** If you don't understand a classmate's comment, ask that person to explain it further.
- **Be open to suggestions.** Listen to team members' suggestions with an open mind and try not to be defensive about the work.

As a giver of feedback:

- **Be considerate of your classmates.** Be as thoughtful in your responses as you would like others to be in responding to you.
- **Speak up.** Your classmates are depending on you for feedback, so don't be afraid to give your opinion.
- **Focus your comments.** For some feedback sessions, you will be given a series of questions to address. Focus your feedback on responses to these questions or to questions that the members of the other team have generated.
- **Be positive.** Comment on strengths as well as on areas that need improvement.
- **Give honest but constructive criticism.** It won't help your classmates in the long run if you tell them that their work is perfect when it still needs some changes or fixes. Be honest about areas that could use improvement, and provide specific suggestions for how the work should change.
- **Point to evidence.** If you are making an observation about a team member's work, point to specific evidence rather than offer only general criticism.

Activity 3B: Preliminary Game Design

Students develop the design of their game and complete a draft of their game design document.

Materials Needed

- **Handout 11: Game Design Document Template**
- **Handout 12: Sample Game Design Document: *The Ghostly Maze***
- Students' copies of **Handout 4: Elements of Games**

1. Introduce the design document activity.
Distribute **Handout 11: Game Design Document Template** and **Handout 12: Sample Game Design Document: *The Ghostly Maze***. Tell students that they are going to build on the treatment they wrote by expanding on their ideas in a design document. Explain that the parts of the design document are similar to those in the reverse-design project.

Ask students:

- Why is writing a game design document an important part of the design process?

  Possible answers: *It allows you to map out the complete game design and acts as a central resource for the development team. (Different members of the team can work on different parts of the design; the document can help keep team members focused on the game's central vision.) It serves as a blueprint that the programmers and artists can use to actually develop the game idea.*

2. Discuss teamwork strategies.
Review Handout 11 and let students know when it needs to be completed.

Tell students that they can collaborate and complete each part of the design document as a team or divide the parts and complete them individually. Point out that they do not need to complete the parts of the document in the order that they're presented.

Ask students:

- What challenges might you encounter as you work together as a design team on a game idea?

  Possible answers: *Different visions of the game, different approaches to design, different work styles, making sure that everyone participates and no one dominates or shirks responsibility*

- What strategies might you use to work together as a team?

  Possible answers: *Using negotiation to come to consensus as a team about game design decisions; if dividing the work, delegating specific responsibilities and scheduling check-in sessions to make sure that everyone has the same expectations*

3. Have students work on the design document.
Give students time to work on the document. Tell them to use **Handout 4: Elements of Games** and **Handout 12: Sample Game Design Document: *The Ghostly Maze*** for reference as they work.

Handout 11:
Game Design Document Template

Use this document to work on your game design. Treat this like a working document—as you formulate your idea, go on to develop your game, play-test your game with classmates, and get feedback, you'll come back to this document and revise it.

Part 1. Vision Statement	
State your vision for the game in a few sentences. Include the following information: **Game synopsis:** What is the game about, and how do you play? **Platform:** What platform will the game be played on? **Appeal:** Who will the game appeal to and why?	
Part 2. Formal Elements	
Players	
How many players play the game? What is the player interaction pattern (for example, player vs. game)?	
Objective(s)	
What does the player try to achieve during the game?	
Resources	
What do players use to help them accomplish their objectives (for example, weapons, currency, special powers)?	

Conflicts and Obstacles	
What obstacles make it challenging for a player to accomplish his or her objective(s) (for example, enemies, lack of time)?	
Rules and Procedures	
Describe how the game works. For example, how does the game begin? Identify at least three rules to include in the game.	

Part 3. Dramatic Elements

Challenges	
Identify at least two challenging tasks that keep players engaged in the game. Describe how you will design the game to ensure that it is challenging enough to be fun, but not so challenging that it's frustrating.	
Play	
Describe the playful aspects of the game. What activities do players do that make the game fun?	
Story	
If the game tells a story, summarize the story.	

Setting and Game World	
Where does the game take place? Describe what the game setting looks and feels like.	

Part 4. User Interface

Manual Interface	
How do players interact with the game? What kind of controls do they use?	

Visual Interface	
What camera viewpoint will you use to show the game environment? Why? What information do you want players to see on the screen (for example, score, time remaining)? Describe the style of your visual interface. (For example, will there be a split screen with the game world depicted in one part of the screen, and information—such as the score—listed in a separate part of the screen? Or will the interface be more integrated?) **Note:** Keep in mind the constraints of the software you're using to create the game (for example, you may not be able to use a certain camera viewpoint).	

Handout 12:
Sample Game Design Document: *The Ghostly Maze*

Part 1. Vision Statement	
State your vision for the game in a few sentences. Include the following information: **Game synopsis:** What is the game about, and how do you play? **Platform:** What platform will the game be played on? **Appeal:** Who will the game appeal to and why?	*Are you fast enough to beat the ghosts? In* The Ghostly Maze, *players race against a clock to collect apples stashed in a maze filled with ghosts. Find the apples and reach safety, or meet your doom in this haunted maze!* *The game will be played online and use keyboard controls.* *The game will appeal to older children and teenagers because the theme is scary, yet fun, and the game allows them to show off their competitive skills and get rewards.*

Part 2. Formal Elements	
Players	
How many players play the game? What is the player interaction pattern (for example, player vs. game)?	*One player at a time plays the game. The game interaction pattern is player vs. game, and the player races to beat the clock.*
Objective(s)	
What does the player try to achieve during the game?	*The objective is to reach the exit of the maze after collecting all the apples.*
Resources	
What do players use to help them accomplish their objectives (for example, weapons, currency, special powers)?	Health: *The player has three bars of health at the beginning of the game. Each time a ghost runs into the player, the player loses one bar of health.* Candy Apples: *There are special glowing candy apples placed in different parts of the maze. "Eating" a candy apple restores one bar of health.*

Conflicts and Obstacles	
What obstacles make it challenging for a player to accomplish his or her objective(s) (for example, enemies, lack of time)?	Enemies: *There are ghosts located throughout the maze, protecting apples by floating nearby.* Time: *The player has to collect all the candy and reach the maze's exit before time runs out on the clock.* Maze: *There are twists, turns, and dead-ends that make it difficult for the player to navigate through the maze.*
Rules and Procedures	
Describe how the game works. For example, how does the game begin? Identify at least three rules to include in the game.	How the game works: *The game begins when the player presses the start button. The player's character stands at the entrance of the maze, in the bottom left-hand corner of the screen. The player moves his or her character by using the arrow buttons to move up, down, right and left.* Rules: • *The player collects apples by moving the character on top of the apple.* • *If a ghosts runs into the character, the character loses one bar of health.* • *If the character loses all three bars of health, the character "dies" and the game is over.* • *"Eating" a glowing candy apple (by moving the character on top of it) restores one bar of health.* • *If the time on the clock runs out before the character has reached the exit, the player loses and the game is over.* • *If the character reaches the exit without collecting all the apples, the player loses and the game is over.* • *If the character reaches the exit before time runs out* and *the character has collected all the apples, the player wins and the game is over.*

Part 3. Dramatic Elements

Challenges	
Identify at least two challenging tasks that keep players engaged in the game. Describe how you will design the game to ensure that it is challenging enough to be fun, but not so challenging that it's frustrating.	*Two challenging tasks the player must complete are:* • *navigating through the maze in a limited amount of time* • *avoiding ghosts* *To make sure the game had the right level of challenge, we did four things:* • *Created enough twists and turns in the maze so that it isn't immediately clear how to get to the exit, but not so many that it's impossible to navigate* • *Set an amount of time to get through the maze that will give players just enough time to finish* • *Included enough ghosts that it's somewhat difficult to avoid them, but not impossible* • *Included a few candy apples, so that players have some resources if they are run into by ghosts, but not so many that players don't have to work at avoiding ghosts*
Play	
Describe the playful aspects of the game. What activities do players do that make the game fun?	*Players will find it fun to navigate through the maze, moving as quickly as they can to find apples and avoid ghosts.*
Premise and Story	
If the game tells a story, summarize the story.	*The story is simple—the player takes on the role of a teenager looking for apples in a maze that turns out to be haunted.*
Setting and Game World	
Where does the game take place? Describe what the game setting looks and feels like.	*The game takes place in a haunted maze, so the game world is designed to be spooky, but whimsical. The colors of the maze are blue and black. The ghosts will look more like cartoon ghosts than scary ghosts. The apples will be brightly colored to stand out from the background.*

Part 4. User Interface

Manual Interface	
How do players interact with the game? What kind of controls do they use?	*Players use their computer's keyboard and mouse to control their player's movements and other actions.*
Visual Interface	
What camera viewpoint will you use to show the game environment? Why? What information do you want players to see on the screen (for example, score, time remaining)? Describe the style of your visual interface. (For example, will there be a split screen with the game world depicted in one part of the screen and information—such as the score—listed in a separate part of the screen? Or will the interface be more integrated?) ***Note:*** Keep in mind the constraints of the software you're using to create the game (for example, you may not be able to use a certain camera viewpoint).	*The camera viewpoint is an overhead viewpoint. This will make it easier for the player to see the entire maze and try to figure out how to navigate through it quickly.* *Players can see the amount of health they have, the time to beat on a clock that counts down, and the number of apples they've picked up, along with the total number of apples in the maze.* *There will be a split screen with the information listed in a separate part of the screen at the top of the game.*

Activity 3C: Interface Design

Teams finalize the manual and visual interface for their game. Students create a control table and a set of wireframe interfaces for various screens in their game.

> **Note:** In some game development software programs, students may have little or no control over the user interface design. If this is the case, you can omit this activity or explain to students that they will create a control table and wireframes showing their ideal user interface design for the game.

Materials Needed

- **Handout 13: Creating a Control Table and Wireframes**
- Students' completed copies of **Handout 11: Game Design Document Template**
- Optional: Computers with illustration software, such as Adobe Illustrator® or Photoshop®
- Students' copies of **Assessment Checklist 2: Unit Project—Game Design Document and Wireframes**

1. Introduce the interface design activity.
Tell students that now that they have determined how their game is played, they are going to work on what their game looks like.

Distribute **Handout 13: Creating a Control Table and Wireframes** and go over it with the class.

2. Have students review the interface section of their game design document.
Tell students that before they create a control table and wireframes, they are going to revisit their game design document. Team members should agree on the visual interface style of their game, including the camera viewpoint. Remind students that they also need to take into consideration the limitations of the game development software.

Have each team decide on two to four screens for which they'll create wireframes. Have teams assign members to work on each wireframe.

3. Have students create control tables and sketch wireframes.
Tell students to use their copies of Handout 11 and the sample wireframe on Handout 13 to guide them as they create control tables and sketch their wireframes.

Note: Students can sketch their wireframes with pencil and paper. Alternatively, if your students have the skills and you have the equipment available, you can have them use illustration software, such as Adobe Illustrator®, to create their wireframe sketches.

4. Have students share wireframes with their teammates.
Have students meet within their teams to check that the style of their wireframes is consistent. Have students make any revisions necessary to make their sketches more unified.

Tell students to fill in the Student Comments section of Assessment Checklist 2, either in class or outside of class. Let students know when you expect them to hand in the assessment.

Handout 13:
Creating a Control Table and Wireframes

Now that your team has determined how your game works, you can fill in the details of what your game looks like. To describe the user interface, you'll create a control table and wireframes for the game.

Create a Control Table

How do players communicate actions and decisions to the game? Do they click a mouse, press keys on a keyboard, move a joystick? Create a simple control table that tells how players communicate their actions and decisions.

Include how the player takes the action and how the game displays the action taken.

For example, a control table for a computer-based game might look like this:

Key	**Action**
Up arrow key	Walk forward
Down arrow key	Walk back
Shift + up arrow key	Run

Create Wireframes

Wireframes are sketches of game screens that show how information will be displayed onscreen. To picture a wireframe, imagine a completed game screen with its art and graphics peeled away. What you see is a barebones display of the screen's information and controls.

As a team, create wireframes for two to four screens in your game. For example, one wireframe might be the starting screen where a player chooses and configures a character. Another wireframe might be a screen from the middle of the game.

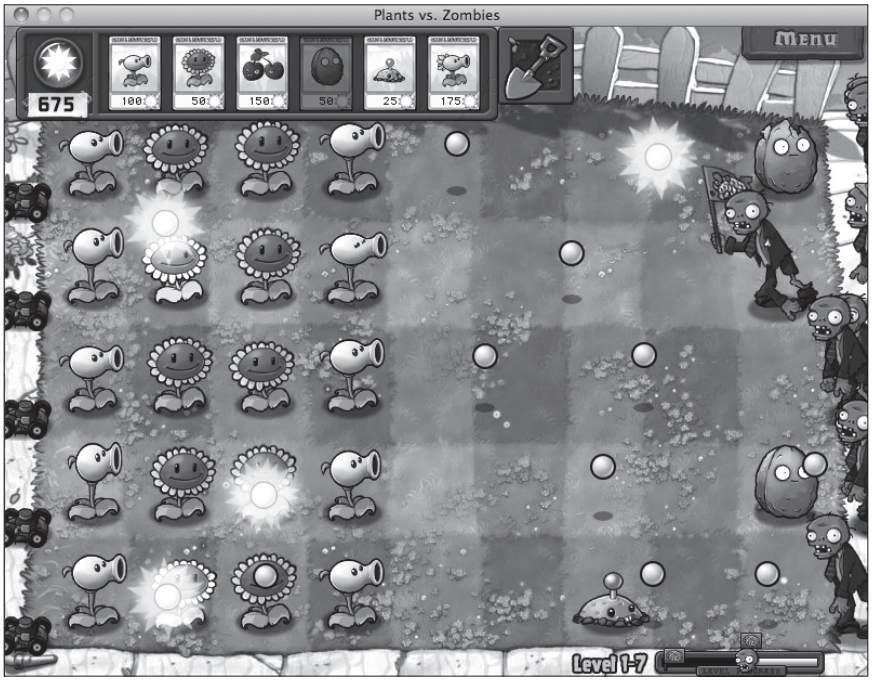
Each wireframe should show the following:

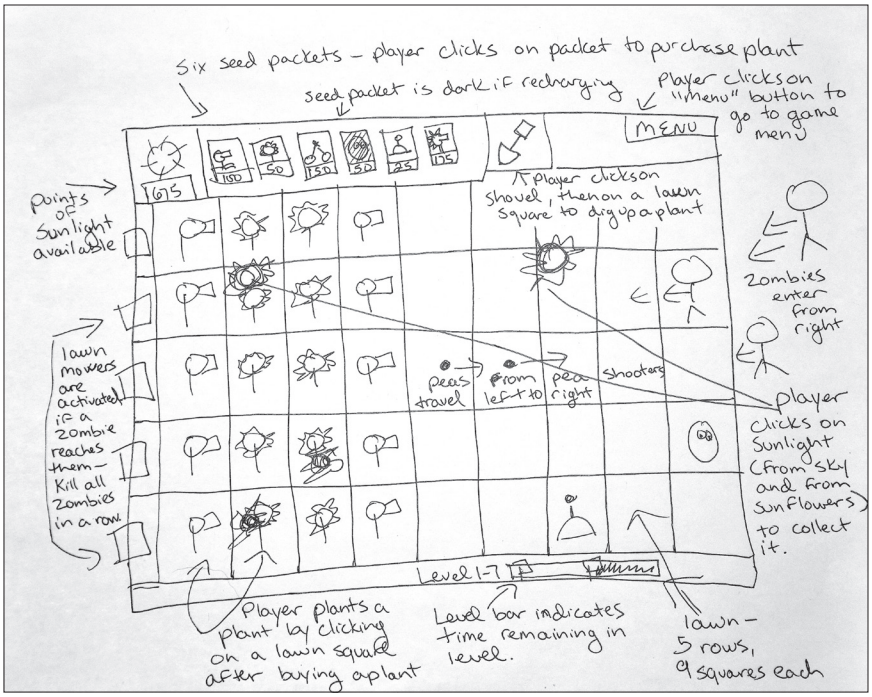
- The information available to a player on the screen, such as score and time remaining
- The *player controls*—icons that a player clicks on to take action, such as moving a character, picking up something, or shooting something
- The camera viewpoint, such as an aerial view or a first-person perspective

Keep in mind that your wireframes are sketches and not final art. It's okay to draw stick figures to represent different characters on the screen.

You'll have an opportunity later to work on the visual elements and details of your characters. At that time, you'll also use color, line, and other elements of art to depict your game world.

As an example, here is a screenshot from the game *Plants vs. Zombies* and what the wireframe for that screen might look like.





Activity 3D: Art Design

Students analyze the role that art plays in the design of a successful video game. Students create art for their games—either digital art that they will use when they develop their game, or concept art showing what a polished version of their game would look like.

Sequence

3D.1: ***Analyzing Art***	Students look at screenshots of video games and analyze the elements of art and the techniques used to engage players.
3D.2: ***Creating Game Art***	Students create rough sketches of art for their video games, share their sketches with the class, and create polished concept art sketches or digital art that incorporates the feedback they receive.

Materials Needed

- **Handout 14: The Elements of Art and Principles of Design**
- Screenshots of images from video games (see *Advance Preparation*)
- **Handout 15: Analyzing Game Art**
- **Handout 16: Creating Game Art**
- **Assessment Checklist 3: Unit Project—Game Art**
- Optional: Computers with Internet access
- Drawing materials, such as charcoal and colored pencils
- Sticky notes (several for each student)
- Optional: Computers with illustration software, such as Adobe Illustrator® or Photoshop®

Advance Preparation

- For Activity 3D.1, choose six or seven screenshots from video games that show detailed and image-rich settings and/or close-up images of game characters. Examples should represent a variety of art styles, from realistic to cartoon-like to abstract. (See *Media & Resources* for suggestions.) If there are specific principles of design or elements of art that you want students to learn more about, you may want to show examples or non-examples of these for analysis.

Note: A sample analysis of *LostWinds: Winter of the Melodias* is provided in this activity.

- Before Activity 3D.2, decide whether you will have students create digital art to use in their games or concept art showing what a polished version of their game would look like. If students are creating digital art, determine what kinds of art they will make (such as characters, objects in the game, or backgrounds).

3D.1: Analyzing Art

1. Introduce the art analysis activity.
Tell students that they are now going to work on the visual elements of their game. Explain that they will analyze images from video games in order to understand the role that art and graphics play in game design.

Give students **Handout 14: The Elements of Art and Principles of Design**. Go over the handout and make sure that students are familiar with all the elements and principles.

2. Display images and model analysis of one screenshot.
Show students the video game screenshots that you have selected.

Distribute **Handout 15: Analyzing Game Art** and have students read it. Use the questions on the handout to model an analysis of one screenshot.

Teacher's Notes:
Sample Analysis of *LostWinds: Winter of the Melodias*

Screenshot from *LostWinds: Winter of the Melodias* by Frontier Developments.

What adjectives come to your mind when you see this image?
Beautiful, peaceful, cavernous, mysterious, still, natural, fantastical

How does this image make you feel?
The image might make you feel calm, or filled with wonder, or it might make you feel like exploring the natural environment of the cave.

What can you tell or infer about the setting or world of this particular game? How?
The game appears to be set outdoors in a mostly natural environment.

This scene takes place underground in a cave, but the light coming from the opening above the waterfall indicates that part of the game may take place above ground.

The strange looking creature in the center of the screen might indicate that the game takes place in a fantasy realm.

There are no enemies or monsters in the scene, so the game may not be a fighting/shooting game.

How do the artists effectively use the elements of art and principles of design?
The game artists use repetition of forms (such as the conical stone forms and the bushes) and a muted color palette to create a sense of unity in the scene. There is enough variety in the repeating forms (in their placement and size) to create visual interest for the viewer. The scene uses contrast in value to draw the viewer's eye to the area in the scene around the waterfall (which is lighter in value than the rest of the scene). The game artists also make effective use of symmetrical balance.

What do you think the mood of this game is?
The game seems to be whimsical or fantastical. The mood might also be considered peaceful.

How do the artists use the elements of art and principles of design to convey this mood?
The mood is conveyed through the use of various techniques:

- A muted color palette that doesn't quite match the real world
- The use of simplified shapes and forms to create a cartoon-like rather than realistic natural environment
- The use of contrast (for example, the dark values of the deep shadows in the cave make the cave seem mysterious, and the use of very light values in the sunlight above the waterfall imparts a sense of wonder)

3. Have pairs analyze screenshots.
Have students work with a partner. Assign each pair one screenshot or have pairs choose a screenshot to analyze. Tell students to complete Handout 15 as they analyze their screenshot.

4. Share screenshot analyses and discuss visual elements of games.
Ask volunteers to share their analyses of video game screenshots with the class.

Discuss the role that art plays in the design of a successful video game. Ask:

- What different kinds of visual styles were displayed in the screenshots? What factors might influence a designer's choice of a particular style?

  Possible answers: *Realistic, abstract, cartoon-like, and fantastical styles were displayed. Some games, such as* Half-Life 2*, use an almost photo-realistic style in an effort to be dramatic or serious and to replicate the real world. Designers who are trying to create a more light-hearted game might use a more cartoon-like style, such as the style used in* Banjo-Kazooie*, which is set in an imaginary world. Puzzle-based games, such as* Tetris*, may be much more abstract or two-dimensional.*

- How were different elements of art used to convey different moods or feelings?

  Possible answers: *Color is used to convey mood. Bright, warm colors may indicate a happy or inviting setting, while darker colors and shadows may indicate scary or foreboding settings and moods.*

  The use of line, shape, form, texture, and space can all affect mood. Jagged lines and rough-looking textures can convey tension or danger, while smooth, flowing lines and shapes might suggest peacefulness. Large open spaces might suggest freedom, while small confined spaces can make a player feel closed in.

- What design principles did you recognize in the images? Do the objects, characters, and other design elements in one screenshot look like they belong together? How can you tell that they are part of the same game?

Teacher's Notes: Discussing the Principles of Design

Prompt students to discuss the ways that the artists and designers use balance, contrast, dominance, emphasis, movement, repetition, rhythm, subordination, unity, and variety in the images.

Call particular attention to the artists' and designers' use of *unity*, or the careful blending of elements to achieve an overall visual effect. In a well-designed game, all the elements—landscapes, characters, objects, and typography—have a similar look and feel.

Discuss the qualities that make different objects or features in a single screenshot look as if they belong together.

Handout 14:
The Elements of Art and Principles of Design

Just as artists who work in other visual art forms do, video game artists use the *elements of art*—the components used to create works of art, such as line, color, and shape—and *principles of design*—concepts relating to how the elements of art are arranged, such as balance, contrast, and rhythm.

Elements of Art

Color: The visual sensation dependent on the reflection or absorption of light from a given surface. The three characteristics of color are *hue*, *value*, and *intensity*.

Form: A three-dimensional object (such as a sphere or cube) or the illusion of three dimensions.

Line: The path made by a point moving in space. Lines can vary in width, length, curvature, color, and direction.

Shape: A two-dimensional area or plane that may be open or closed, free-form or geometric.

Space: The emptiness or open area between, around, above, below, or within objects. *Shapes* and *forms* are defined by the space around and within them. Conversely, *spaces* are defined by the shapes and forms around and within them.

Texture: The surface quality of materials, either actual (felt/tactile) or implied (visual).

Value: The lightness or darkness of a hue or neutral color (such as gray).

Principles of Design

Balance: The arrangement of visual arts elements to create a feeling of stability or an equal distribution of visual "weight" in a work of art.

Contrast: The difference between two or more elements (e.g., value, color, texture) in a composition; the bringing together of dissimilar elements in a work of art; the degree of difference between the lightest and darkest parts of a picture.

Dominance: The emphasis of one aspect in relation to all other aspects of a design.

Emphasis: Special stress given to an element to make it stand out.

Movement: The principle of design dealing with the creation of action; a way of causing the eye of the viewer to travel within and across the boundary of a work of art.

Repetition: The recurrence of elements of art at regular intervals.

Rhythm: Intentional, regular repetition of design elements to achieve a specific effect or pattern.

Subordination: Making an element appear to hold secondary or lesser importance within a design or work of art.

Unity: The total visual effect of a composition, achieved by the careful blending of the elements of art and the principles of design.

Variety: A principle of design concerned with combining elements of art in different ways to create interest.

Vocabulary for Critiquing Use of the Elements of Art

Terms that you can use to describe different elements of art are given below.

Line

- Descriptive (a line that depicts something in a drawing, helping viewers to understand what is shown)
- Expressive (a line that expresses a feeling)
- Implied (a line that is suggested but not explicitly drawn, such as the line created when one color ends and another begins)
- Curved, jagged, or straight
- Closed or open

You might also use descriptions such as *soft*, *hard*, or *smooth*.

Shape (2-D)

- Positive (figure) or negative (ground)
- Geometric (perfectly straight or round) or organic (irregular; not perfectly straight or round)
- Closed or open

You might also use descriptions such as *large*, *small*, *wide*, *narrow*, *long*, or *short*.

Form (3-D)

- Geometric or organic
- Closed or open

You might also use descriptions such as *large*, *small*, *wide*, *narrow*, *high*, *deep*, or *shallow*.

Color

- Intensity: Low (dull) or high (bright)
- Value: Tint (the lighter range of a color, such as the color mixed with white or lightened with water) and shade (the darker range, such as the color mixed with black or dark gray)
- Expression: Warm (such as yellow, orange, and red), cool (such as blue, green, and violet), or neutral (such as gray, brown, and black)
- Hue: Primary (yellow, red, and blue), secondary (orange, green, and violet), or intermediate (between primary and secondary, such as yellow-orange and blue-green)
- Arrangements: Complementary (contrasting colors, those that are opposites on the color wheel), analogous (colors that are close together), or monochromatic (different values of the same color)

Space

- Positive or negative
- Perspective in 2-D art: One-point, two-point, or three-point
- Placement in space to create depth in 2-D art: Low, high, or overlapping

Texture

- Real or simulated
- Glossy or matte

You might also use descriptions such as *coarse*, *smooth*, *sharp*, *shiny*, *bumpy*, or *fuzzy*.

Handout 15:
Analyzing Game Art

Your teacher will assign you an image to analyze. Work with your partner to answer the questions below.

Title of Video Game: _____

What adjectives come to your mind when you see this image?	
How does this image make you feel?	
What can you tell or infer about the setting or world of this particular game? How?	
How do the artists effectively use the elements of art and principles of design?	
What do you think the mood of this game is?	
How do the artists use the elements of art and principles of design to convey this mood?	

3D.2: Creating Game Art

1. Introduce the activity.
Distribute **Handout 16: Creating Game Art** and **Assessment Checklist 3: Unit Project—Game Art** and review them with students. Tell students whether they will create digital art to use in their games or concept art showing what a polished version of their game would look like. If students are creating digital art, tell them what kinds of art they can make, such as characters, objects, or backgrounds.

Have students work in their project teams to answer the questions in Step 1 of Handout 16. Explain that this will help them think through the visual elements of their game and prepare them to create their game art. It will also ensure that team members follow the same approach and style when creating their individual pieces of art.

2. Have students quickly sketch game art.
Have teams assign each team member at least one piece of game art to create.

> **Note:** If time permits, you may want to have students use the Internet to find an image or images to use as inspiration for their concept art sketches.

Give students charcoal pencils, erasers, and other drawing materials. Have students draw a rough sketch of the art they plan to make. Remind them to use their responses to the questions in Step 1 of Handout 16 to guide them as they create their sketches.

> **Note:** Even if students are creating digital art, they should still start by making a sketch with pencil and paper. You may want to demonstrate or review specific drawing techniques, such as using perspective, drawing from observation, or drawing facial expressions. For more information, refer to Part 3 of *Introduction to Visual Arts, Unit 4: Make Me a World*.

3. Have students post and comment on sketches.
Have students post their sketches around the classroom, with teammates' sketches posted together.

Provide students with sticky notes. Tell them that they will look at their classmates' sketches and write comments, responding to the two questions listed in Step 3 of Handout 16:

- What adjectives come to your mind when you see this image?
- What do you think the mood of this game is?

Have students comment on as many sketches as possible.

Note: To make sure that each sketch receives feedback, you may wish to assign students specific sketches to comment on. Otherwise, during the process, monitor which sketches still need feedback, and direct students to those sketches as they move around the room.

4. Have students analyze the comments on their team's sketches.
Have students gather the sticky notes they received for their own sketch and read through the comments. Have students meet in their teams to discuss the responses to their sketches, using the discussion questions in Step 4 of Handout 16.

Have students identify changes to make to their game art based on the feedback they received.

5. Have students create polished game art.
If students are creating digital art, have them use illustration software to create their game art. If necessary, demonstrate software techniques, such as using brushes, creating lines, and filling in shapes with color.

If students are creating concept art, have them create polished sketches of their assigned concept art.

Tell students to fill in the Student Comments section of Assessment Checklist 3, either in class or outside of class. Let students know when you expect them to hand in this assessment.

Handout 16:
Creating Game Art

The visual design of your game helps set the game's mood. It also helps attract and engage players. With your team, you will choose a visual style for your game and then create art for the game—either digital art to use in your game or concept art showing what your game would ideally look like. (Your teacher will tell you which.)

Complete the steps below to create art for your game.

Step 1: Choose a Visual Style

Work with your team to answer the questions in the table below.

Mood	
What mood do you want your game to evoke?	
What adjectives would you use to describe the mood of your game (for example, serious, funny, dramatic, dark, light-hearted, scary, silly)?	
Game Setting	
Where does the game take place?	
Is it a real-world setting, an imaginary world, a more abstract world?	
Is it indoors or outdoors?	
When does the game take place (for example, at night, in the springtime, in the next century)?	

Characters and Objects	
Do people or humanoid characters inhabit the game world? If so, what do they look like?	
If the characters are not like people, what are they? How do they look?	
What objects appear in your game world, and what do they look like?	
Visual Style	
Based on the setting for your game and the mood you want to create, what is the visual style of your game. (for example, realistic, cartoon-like, abstract)?	
Why did you choose this style?	

Step 2: Quickly Sketch Game Art

Assign each team member at least one piece of game art to create. If you are creating digital art, your teacher will tell you what kinds of game art to make. If you are creating concept art, make sure that your team has at least one sketch of each of the following:

- A sketch of the game world—either a representative scene from the game or an image that might appear on the game box
- A sketch of characters or objects that appear in the game world
- A sketch of a screenshot during a moment in the game (you may want to use a wireframe sketch as the basis for creating this piece of concept art)

Create a rough sketch of the game art you've been assigned. As you sketch, think about how you will incorporate the elements of art and principles of design in your work. For example, you might think about the following questions:

- What kinds of lines might you use (such as thick, thin, jagged, or straight)?
- What colors will you include?
- What shapes will you use to create characters and objects?

Step 3: Respond to Sketches

Post your completed game art sketches in the classroom. You'll look at other students' sketches and respond to the following questions:

- What adjectives come to your mind when you see this image?
- What do you think the mood of this game is?

Step 4: Compile Feedback

Gather the feedback on your team's game art sketches. Discuss the following questions with your team:

- Is the feedback about the sketches consistent with the team's intended style and mood for the game? If not, how does the feedback differ?
- Was similar feedback given about each team member's sketch, demonstrating unity in the team's visual style? If not, how did the feedback differ?
- What changes do you want to make to your game art based on the feedback?
- How can you use the elements of art and principles of design in a different way to convey your intended mood and style?

Step 5: Create Polished Game Art

As a team, decide on the changes needed for each piece of game art. Each team member will then create a piece of game art—either a piece of digital art to use in the game, or concept art showing what a polished version of the game would look like.

Assessment Checklist 3:
Unit Project—Game Art

Use this checklist to help you plan and assess your project. Make sure that you include all the required components. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Technical Knowledge and Skills		**Student Comments**	**Teacher Comments**
Demonstrates technical proficiency in using illustration software OR in drawing with pencil and paper.	**20%**		
Exhibits unity with other team artwork created for the same game.	**15%**		
Drawing techniques (digital or manual) demonstrate effort and perseverance.	**15%**		
Content			
Clearly depicts characters, objects, or scenes from the game world.	**15%**		
Conveys the mood of the game as defined by the team.	**15%**		
Creative Expression			
Makes effective use of the elements of art and principles of design.	**20%**		
Total	**100%**		

Activity 3E: Creating the Game

Students use game development software to create the game they've designed. Students play-test one another's games and then revise their own game based on the feedback they receive.

> **Note:** If your students are not using game development software, you can have them create physical prototypes of their game. See **Appendix D: Physical Prototyping Activity**.

Sequence

3E.1: Game Development	Students learn techniques for creating games and then, in their teams, create their game.
3E.2: Discussing Gaming Careers	Students learn about careers related to the unit work, and share the progress they've made on their Career Profile project.
3E.3: Play-Testing	Each team play-tests another team's game and provides feedback and suggestions for improving the game.
3E.4: Revising the Game	Students revise their game based on feedback from the play-testing session.

Materials Needed

- Computers
- Game development software
- Optional: Scripts for user-generated games (see *Advance Preparation*)
- Optional: Tutorials, instruction manuals, or handouts about the game development software
- **Assessment Checklist 4: Unit Project—Completed Game**
- **Handout 6: Game Development Worksheet**
- **Handout 17: Unit 2 Career Information**
- **Handout 18: Play-Testing**
- Students' copies of **Handout 10: Giving and Receiving Feedback**
- Students' completed copies of **Handout 11: Game Design Document Template**

Advance Preparation

- Optional: If the game development software you're using allows users to post scripts for completed games, download one or more scripts for user-generated games that work, are well-constructed, and, ideally, are similar to the kinds of games that students are planning to make. For example, *The Ghostly Maze* game used as an example in the unit is similar in concept to the Pac-Man arcade game. If students were designing a game like *The Ghostly Maze*, you might download scripts for games that were similar to (or clones of) Pac-Man. See *Media & Resources* for links to scripts for completed games.
- Optional: Prepare any tutorials or handouts about the game development software that students are using.

3E.1: Game Development

1. Optional: Have students analyze the code/script for existing games.
Have teams work at computers to analyze the script for a game that you downloaded. If you downloaded scripts for several games, have each team look at the script for the game that most closely resembles the one the team is planning to develop.

Have teams first play their game once or twice so they get a sense of how it works. Have them also spend a few minutes looking at the script. Ask teams to address the following questions:

- In the game, did you encounter any actions or events that made you wonder how they might be coded (such as how a character moved or interacted with an object)? Find the code that controls that action or event and describe what you learned.
- When looking at the code, what language did you see that affected the game in a way you didn't understand? Try altering that code, and describe how it changed the game. Then, using what you've learned, describe the function that the original code performed.

Ask a few teams to share what they learned with the class. Encourage students to refer to the script/code for the completed game as they work on their own game. Discuss with students how they can apply the techniques the game developer used to their own game.

> **Note:** If your students find creating their own game from scratch to be too challenging, one option is to have them modify the code/script for a completed game.

2. Optional: Teach students additional techniques for creating games.
Before students begin working on their game, you may want to teach them any additional concepts or skills they need to know in order to create their game, using any tutorials, instruction manuals, or handouts you have collected or created. These concepts or skills will vary, depending on the game development software and the kinds of games students are creating.

For example, you may need to show students how to load their own digital artwork for use in the game, or how to enable objects to complete more complex actions than they did in students' first games.

Alternately, you may want students to focus on using and strengthening the skills they've already learned, or to implement only the new techniques they learned by analyzing the code from other games.

3. Have students begin to consider how they will program their game.
Give students **Assessment Checklist 4: Unit Project—Completed Game** and answer any questions they have about how their game will be assessed.

Give students new copies of **Handout 6: Game Development Worksheet**. Have students take notes on the worksheet as they think about how they will program their game.

4. Have students develop their game.
Have students work individually, in pairs, or in teams to develop a working version of their games. Encourage students to play-test as they go to identify any places where the game doesn't work as intended.

Teacher's Notes: Managing Game Development

Depending on the number of computers you have available in your classroom, there are a few ways you can structure the game development process:

- If there are enough computers, each student on the team can develop a version of the game, and the team can decide which version to use.
- Students can work in pairs, trading off programming and play-testing, and teams can again choose which version of the game to use.
- Students can work in teams to develop one game, taking turns programming, observing, and play-testing.

When they aren't programming, students can work on game art or on the Career Profile project.

Assessment Checklist 4:
Unit Project—Completed Game

Use this checklist to help you plan and assess your project. Make sure that you include all the required components. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Technical Knowledge and Skills		**Student Comments**	**Teacher Comments**
Student demonstrates technical proficiency in using game development software.	**10%**		
Game is playable from start to finish.	**10%**		
Student demonstrates effort and perseverance in using game development software.	**10%**		
Content			
Premise and rules of the game are clear to players.	**10%**		
Visual interface clearly conveys all the information players need to access during the game and provides the controls players need to take action in the game.	**10%**		

Creative Expression			
Game makes effective use of formal elements, such as objectives, resources, conflicts, and rules, to make a playable, engaging game.	**15%**		
Game makes effective use of dramatic elements, such as challenge, play, premise, and characters (if relevant), to make a playable, engaging game.	**15%**		
Game is fun to play.	**10%**		
Game has an appropriate level of challenge.	**10%**		
Total	**100%**		

3E.2: Discussing Gaming Careers

> **Note:** This activity can be completed at any point during or following the game development process.

1. Discuss careers in game design and development with students.
Distribute **Handout 17: Unit 2 Career Information**.

Have students read over the handout. Ask:

- How is the work that you have engaged in so far during Unit 2 similar to the kinds of work done in the careers described in the handout?
- Which career is most interesting to you? Why?

2. Check in with students about the Career Profile project.
Ask students to share the progress they've made on their Career Profile project, and help students troubleshoot any difficulties they've encountered in conducting their research.

Let students know when the project should be completed.

Handout 17:
Unit 2 Career Information

Below are some AME gaming careers that make use of the skills you are learning in Unit 2:

- Animator
- Art director
- Artificial intelligence engineer/programmer
- **Associate producer**
- Composer
- Environment artist or modeler
- Game tester
- **Lead programmer**
- **Level designer**
- Product development director/ Product planner
- Production assistant
- Quality assurance manager
- Script writer
- User interface designer

Key Careers

Key AME gaming careers, some of which make use of the skills you are learning in Unit 2, include associate producer, lead programmer, and level designer.

Associate Producer

The associate producer helps the production team with the daily tasks needed to ensure the delivery of a high-quality game on time and on budget. Game production is a complex process that can take two or more years. The associate producer is assigned tasks by a producer, who oversees the entire process, from game conception through launch.

An associate producer's tasks change as the game moves through different stages of development. Tasks may include planning and scheduling, identifying potential problems, and setting and communicating priorities. Associate producers also help the producer allocate staff in order to ensure the project's completion.

Associate producers help to monitor budget expenditures and sometimes oversee the budget review and approval process. They may also archive and file documents. As a game launch approaches, an associate producer might organize the release of demos, attend trade shows, or coordinate press visits.

In recent years, an increasing number of tasks related to game development, such as music, voice talent, art, and programming, are completed by outside companies. An associate producer creates contracts with these companies, communicates with them, and oversees the quality and timeliness of their work.

Associate producers are hired by both publishers and independent development studios. The positions may vary slightly. For example, associate producers who work for publishers might focus on communication between the sales/marketing department and the game developer, or they might support the work of an outside producer. In a development studio, an associate producer might manage communication between different departments, such as art, design, and programming.

Skills: Associate producers must have a good understanding of all phases of game production, including pre-production, budgeting and scheduling, development, approval and testing, and marketing. Associate producers should have strong project management skills, such as scheduling, setting goals, and managing priorities. They should be detail-oriented and organized.

Associate producers must be able to use a variety of database and spreadsheet programs. They should have excellent communication skills, both verbal and written; a high level of confidence; and the motivation to learn new skills. They should also be able to work well as part of a team. An associate producer may work long hours, especially as a game launch nears.

Pathway: Associate producer is a low-level, though not entry-level, job in the production department. A person can move into this position with three years of experience. There are no formal education requirements for an associate producer, but most candidates have a four-year degree in computer science or liberal arts. Classes in business administration are also desirable.

Many associate producers begin as play-testers for a developer or publisher, moving on to become assistant producer and then associate producer. Some associate producers move into the field after a few years of production experience in a related industry, such as film, TV, or Web development.

Much of an associate producer's training occurs on the job. Associate producers can move up to become producers. After many years experience, some may become executive producers in charge of an entire game franchise.

Lead Programmer

The lead programmer runs the programming department, which is responsible for writing all the computer code for a game. Lead programmers work at both independent development studios and studios owned by publishing companies.

In the early stages of game development, lead programmers work with the game designer and lead artist to develop the technical specifications for a game. Lead programmers then assemble a team of programmers from within the studio or hire programmers to fill specific needs.

Lead programmers are responsible for overseeing each "build," or version, of a game. They work with the programmers on their team to fix bugs and solve problems so that each subsequent build is an improvement over the previous one. Lead programmers may also help to write code.

The lead programmer oversees a wide range of specialized roles within the programming department. These include game engine development, development of tools (such as game-world editing tools used by level designers), artificial intelligence, physics, and character control. Lead programmers are responsible for ensuring the quality of a game's programming and for moving the project forward on schedule.

Skills: Lead programmers must have an understanding of the different programming requirements of multiple gaming "platforms," such as consoles, PCs, and mobile or hand-held devices. They must also be

knowledgeable about the newest trends in software development. Lead programmers must have a solid technical grounding in C++ and other programming languages.

In order to solve problems or complete a project on time, lead programmers may take on programming tasks. They need to be able to perform all types of specialized programming, from game engine development to user interface development.

Lead programmers must be excellent leaders, able to inspire and motivate their teams. They must also have excellent communication skills in order to work with other departments. The ability to think creatively to solve problems is critical. Lead programmers have a very high level of responsibility and often work long hours to meet project deadlines.

Pathway: Lead programmer is one of the highest-paid positions in the gaming field and requires considerable experience, both as a programmer and as a project and team leader. In most cases, applicants must have at least five years experience as a programmer.

A typical career route might be to start as a play-tester, move into the programming department as a junior programmer, and then become a specialized programmer, such as a physics, interface, or artificial intelligence engineer. Some lead programmers go on to become chief technology officers or directors of technology.

Most programmers are avid game players, and many began programming as a hobby. Lead programmers must have a four-year degree in computer science, math, physics, or electrical engineering. Because of the desirability and competition for the position, many applicants also have post-graduate training. While education is very important for this role, demonstrating strong experience is equally as important in acquiring a job.

Level Designer

Level designers (LDs) work in a gaming company's design department, which is responsible for creating the setting, the story, the characters, and all design elements that make up a game. Designers communicate these needs to the artists and programmers who make the game run. A game designer responsible for the entire game directs the work of the LDs for each game.

The game designer assigns each LD a "game level" or self-contained scenario or mission. While the LDs must follow the vision set out in the game design document, each LD has a major impact on the overall game-play experience of the user.

LDs create and map the environment for their level, including designing the layout and lighting of the objects, characters, and structures in the game. By imagining themselves as players, LDs also figure out the logical flow of the game-play in their level, the goals and challenges, and the actions a character must take to move to the next level.

LDs sketch on paper or use a 2-D drawing program to map out their ideas. To create and make edits to a level, an LD might use a 3-D modeling program. Many gaming companies have developed their own unique editing tools for making changes to game worlds.

LDs act as a game's first play-testers by playing their levels to check for problems. LDs must be able to understand the technical limitations of a game. Throughout the design process, LDs work closely with the programmers and the artists to create a list of all the level assets, which are the files that artists will create for the level.

Skills: To map out exciting game play, LDs need to be creative and imaginative. They also need to be able to think logically. LDs should have an understanding of basic art and design principles, as well as composition and color, so that they can communicate the feeling of the game world to the artists. LDs should also be comfortable using 3-D modeling programs, such as *Maya* and *Autodesk 3ds Max*.

While the ability to do detailed programming is not required, an understanding of programming principles and working knowledge of programming languages, such as C++, is critical. Because LDs interact frequently with artists and programmers, they need to be good communicators and be able to work as part of a team.

Pathway: LDs are hired by independent development studios and studios owned by publishing companies. LD positions are highly sought after, and competition for jobs is keen. Most LDs hold a four-year degree, with majors in graphic or technical design or engineering and software development. One to three years of previous experience in game design is required.

Many LDs begin as assistant designers or production assistants. Some LDs break into the field by working as game testers in a quality assurance department. Additional training is usually acquired on the job. Many LDs aspire to become game designers and then lead or senior game designers on larger projects.

When applying for a job as an LD, it is important to have a portfolio of quality work that includes finished game levels that are fun and interesting. To gain experience, professionals in the field suggest "modding" or creating unique levels for games. Some games provide software for this purpose as part of the game package. Professionals also advise playing many different games in order to build an understanding of what makes a dynamic and appealing game experience.

3E.3: Play-Testing

1. Introduce the play-testing process.
Distribute **Handout 18: Play-Testing**. Tell students that they are going to pair up with another team and take turns play-testing each other's games.

Go over the play-testing process described on the handout.

> **Note:** Tell students that they should determine exactly how many players are needed to play-test their game (this will likely be just one student, or two at most). Have the remaining students on the team act as observers.

2. Discuss the challenges of giving and receiving feedback.
Point out the instructions in Step 4 of Handout 18 for giving and receiving feedback. Emphasize that after their game has been play-tested, the design team should listen to the play-testers' feedback without commenting.

Have students look over Handout 10 to review feedback protocol and tips for giving and receiving constructive feedback.

3. Have teams create feedback questions.
Have the class brainstorm questions that they may want their play-testers to answer. Tell students that these can be a mix of general and specific questions.

Teacher's Notes: Questions for Soliciting Play-Test Feedback

General questions might include:

- Is the game fun to play?
- Were any parts of the game confusing?
- Is there any additional information that would have been useful to have while you were playing the game?

Specific questions will vary according to the type of game students are designing, but may include questions about the size and shape of the game world, the amount of chance and/or strategy required to play the game, or the number and balance of obstacles and rewards (e.g., Are there enough enemies or monsters? Too many?).

Tell teams to aim for a final list of four to six questions to ask their play-testers.

4. Have teams play-test their games.
Have each team pair up with another team.

Have one team play-test its game with the other team, following the steps on Handout 18.

> **Note:** You may want to have teams play the game for a set amount of time, such as 10 minutes, so that each team is on the same schedule.

Have teams switch roles and repeat the process.

5. Have students reflect on the play-testing process.
Have students complete **Journal 5**.

Journal 5

- What was challenging about building and play-testing your game?
- What is one piece of feedback you got from your play-testers that was helpful?
- What is one change you want to make to the game based on the feedback you got from your play-testers?

Handout 18:
Play-Testing

You are going to work with another team to play-test each other's games and provide feedback on how functional, playable, and fun the other team's game is—and that team will do the same for you.

Decide which team's game to play-test first, and then complete the steps below.

Step 1: Give an Overview of the Game

Tell the other team about your game. Go over the game rules and procedures.

Step 2: Have the Play-Testers Play the Game

Ask your play-testers to "think aloud" as much as possible as they're playing the game. This will help you understand the players' expectations. For example, a play-tester might say, "*Okay, I'm going to try this path because I think the treasure is over there. Oh, I guess it's a dead end. So what do I do now?*"

Depending on the type of game you created, you may need to guide the play-testers or answer questions for them while they play the game.

Step 3: Observe

Watch the play-testers as they're playing. Take notes about your observations:

- What parts of the game do play-testers seem to enjoy?
- Are the play-testers having any problems playing the game? Do any parts of the game seem confusing to them?
- Are there parts of the game that seem too challenging? Not challenging enough?

Step 4: Listen to Feedback

After the play-testers finish playing the game, ask them to respond to the specific feedback questions your team has come up with. Listen and take notes on the play-testers' comments without responding or defending the decisions your team made about your game. Ask if the play-testers have any other comments on the game.

Important Points About Feedback

One of the most difficult parts of this process is listening to feedback without responding immediately to each comment. Try to listen carefully to what the play-testers say without interrupting them.

At the end of the feedback session, you can ask the play-testers follow-up questions or clarify information about the game for them.

Remember that the goal of play-testing is to get valuable feedback that will help you improve your game. With that purpose in mind, you should listen carefully to all of the play-testers' comments.

Ultimately, you and your teammates will choose which comments and advice to follow when you make changes to your game.

3E.4: Revising the Game

1. Have teams discuss the feedback they received.
Have students share their journal responses about changes they want to make to their game.

Have students work in their teams to decide which changes to make.

2. Have teams revise their games.
Have students make changes to their games based on the feedback they received.

3. (Optional) Have teams play-test their games again.
If time allows, have the same teams pair up and play-test their games again, offering feedback on any changes that were made.

4. Have teams revise their game design documents.
Have teams update Handout 11 as necessary, based on the changes they made to their games.

Tell students to fill in the Student Comments section of Assessment Checklist 4, either in class or outside of class. Let students know when you expect them to hand in this assessment.

Part 4: Presenting the Game

Students complete their Career Profile projects, and prepare and deliver presentations for their video games.

Length
5 50-minute sessions

Activity 4A: The Career Profile Project

Students complete work on the Career Profile project and share what they have learned with their classmates.

> **Note:** If students completed the Career Profile project while taking *DIMIA Foundations in Media and Digital Design: Audio & Video*, completion of the project is optional in this course.

Sequence

4A.1: Preparing the Presentation	Students complete work on their Career Profile project and prepare a short presentation for their classmates.
4A.2: Career Profile Presentations	Students meet in small groups to share their Career Profile presentations.

Materials Needed

- Students' copies of **Handout 11: Career Profile Project** from *Foundations in Media and Digital Design: Animation & Game Design, Unit 1: The Animated World* (this handout is also included in this unit as **Appendix E: The Career Profile Project**)
- **Assessment Checklist 5: Career Profile Project**
- **Handout 19: Career Profile Presentation**
- **Handout 20: Career Profile Peer Assessment** (four copies for each student)
- Equipment to play clips of media productions selected by students, such as DVD players, TVs, or computers with speakers (enough equipment for several students to play clips at the same time)

Advance Preparation

- If you have invited AME professionals to attend students' game presentations in Activity 4B, confirm the arrangements with them.

4A.1: Preparing the Presentation

1. Have students complete their research and writing.
Have students look at **Handout 11: Career Profile Project** from *Foundations in Media and Digital Design: Animation & Game Design, Unit 1: The Animated World* (or give them copies of **Appendix E**). Give students **Assessment Checklist 5: Career Profile Project**. Review with them the requirements for the written components of the project.

Have students complete their research for the project and finalize their write-ups of their chosen AME professionals' education, training, and career path, and their analyses of one of the professional's works.

2. Discuss the presentation with students.
Distribute **Handout 19: Career Profile Presentation** and go over the information.

3. Have students prepare their presentations.
Have students prepare a five-minute presentation, using Handout 19 as a guide. Have them choose a one- to two-minute media clip that is representative of the work they analyzed.

> **Note:** Check in with students to see what kind of clip (audio, video, or video game) they are using, and plan to have the appropriate equipment available. Alternatively, you can have students show screenshots of the work in place of a clip (with the exception of audio.)

Assessment Checklist 5:
Career Profile Project

Use this checklist to help you plan and assess your project. Make sure that you include all the required components. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Written Career Profile		**Student Comments**	**Teacher Comments**
Describes AME professional's education and training background.	**20%**		
Describes how the professional began his or her career and the career path that led to his or her current position.	**20%**		
Lists the media productions the professional has worked on and the role that she or he played on each.	**10%**		
Includes a timeline of major career milestones and media productions.	**15%**		
Includes an analysis of a clip from one of the professional's media productions, pointing to visual and/or audio elements that contribute to the work's success.	**20%**		
Describes the role the professional played in making the media production successful.	**15%**		
Total	**100%**		

Requirements	Percentage of Total Grade	Comments	
Career Profile Presentation		**Student Comments**	**Teacher Comments**
Clearly outlines the AME professional's education and training.	**30%**		
Succinctly describes the professional's career path.	**30%**		
Describes and analyzes a media production and explains the professional's role in its creation.	**30%**		
Successfully addresses the audience's questions.	**10%**		
Total	**100%**		

Handout 19:
Career Profile Presentation

Throughout the course, you've had the opportunity to learn more about an AME professional whose work and career you found interesting or inspiring. Now you'll have the chance to share what you've learned with your classmates and to learn about the AME professionals they've chosen to profile. Your presentation should:

- be short and to the point (about five minutes long)
- include information about the person you've profiled
- include information about the career field this person works in

At the end of the presentation, you'll also show a short clip from the media production that you analyzed and answer questions from your classmates.

As you design your presentation, be sure to include each of the following components.

Information about the AME Professional

Briefly describe the AME professional you've chosen:

- What is the professional's name and job title?
- What company does the person work at (or does the person freelance)?
- What kinds of productions does he or she work on?
- Why did you choose to profile this person?

Education and Training

Describe the professional's education and training, including information about the college this person attended and any other training he or she received.

Career Path

Show the timeline you've created with the professional's major career milestones and the productions he or she has worked on. Answer the following questions:

- How did the professional get started in the industry?
- What role does he or she play in the industry today?
- What different jobs has the professional had throughout his or her career?
- What major media productions has the professional worked on?

Short Clip of the Media Production

Play a one- to two-minute clip from the media production that you analyzed for the career profile. Answer the following questions:

- What role did the professional play in creating this work?
- What factors make this work successful? How do you think the professional you profiled contributed to the success of the work?
- If the professional has a particular style that he or she usually works in (such as an animation style), how is that style expressed in the work?

4A.2: Career Profile Presentations

1. Explain the presentation process to students.
Explain that students will meet in small groups for their presentations and that group members will each share what they have learned about their chosen AME professional and his or her career. Group members will also play the short media clip they selected.

Tell students that they will then meet in a different group and repeat the process. Explain that this will enable students to learn about several different AME professionals and careers.

Distribute four copies of **Handout 20: Career Profile Peer Assessment** to each student. Tell them that they will use the handouts to assess one another's presentations.

2. Conduct the first round of presentations.
Divide the class into teams of three. Have students take turns giving their presentations to their team members. At the conclusion of each presentation, students should answer questions from their teammates. Have team members use Handout 20 to assess each presentation.

3. Conduct the second round of presentations.
Divide the class into different teams of three and repeat the process.

> **Note:** If time is short, you can have students complete only one round of presentations. However, completing two rounds is preferable because students will be exposed to a wider range of AME careers.

4. Discuss the presentations.
Discuss what students learned during the presentations. Ask:

- What interesting fact did you learn about one of the careers?
- If you had to spend a week working at one of the jobs you learned about today, which job would it be? Why?
- Were there common threads in the kinds of education and training that the AME professionals received? If so, what were they?
- How has the work you've done in this course prepared you to do the kinds of work that the AME professionals you've learned about do?

5. Collect peer assessments.
Collect students' completed copies of Handout 20. You can use students' comments on the handout to inform your assessment of their work.

Copy enough handouts so that each student has a copy of each assessment of his or her presentation. Explain to students that they can use the comments to inform their work on future presentations.

Handout 20:
Career Profile Peer Assessment

Complete the table below as you listen to your teammates' presentations. Keep in mind that you will share your assessment with the presenter.

Name of presenter	
Name of AME professional profiled	
Your question for the presenter	Question: Notes on the answer you received:
What was one interesting thing that you learned about the AME professional or his or her career during the presentation?	
What did the presenter do well during the presentation? *Note: For this question and the one below, you can look at Assessment Checklist 5 for ideas.*	
What areas could the presenter improve on in future presentations?	

Activity 4B:
Preparing and Delivering the Presentation

Students work in their teams to develop and deliver the presentation for their game. They reflect on what they have learned throughout the unit.

Materials Needed

- **Handout 21: Presenting Your Game**
- **Assessment Checklist 6: Unit Project—Presentation**
- Teams' completed video game treatment
- Team's completed copies of **Handout 11: Game Design Document Template**
- Teams' completed game interface wireframe
- Completed game art (either digital art used in the game or concept art)
- Completed game
- Computers for teams' demonstrations of game play
- Optional: Projector for displaying students' games as they demonstrate game play

1. Have students prepare their game presentation.
Distribute **Handout 21: Presenting Your Game** and **Assessment Checklist 6: Unit Project—Presentation**. Tell students that they will work in their teams to develop a presentation for their game and then deliver their presentation to an audience.

Have students use their completed copies of Handout 11; their team's completed video game treatment, game interface wireframe, and game art; and their completed game to create their team presentation.

Have team members decide who is responsible for delivering each part of the presentation. Each team member should have a role.

2. Have teams present their games.
Have each team present its game to the audience.

Tell students to take notes during the other teams' presentations so that they can offer constructive comments afterward.

After each presentation, invite the audience to ask questions or offer comments on the game.

3. Have students reflect on the unit.
Assign Journal 6 and have students write reflections about their unit work.

Journal 6

- What was your favorite part of the video game design and creation process? What did you especially enjoy about it?
- What was the most challenging part of the video game design process? What did you find especially challenging about it?
- What did you learn about the principles of game design during this unit?
- What did you learn about the role that art and graphics play in creating a successful video game?
- What did you learn about the process of creating a game?
- What would you do differently if you were to do this project again?

4. Discuss students' reflections on the unit.
Discuss students' responses to Journal 6.

Have students fill out the Student Comments section of the Assessment Checklist 6. Collect the completed assessments.

Handout 21:
Presenting Your Game

You and your team have developed a great game. Now it's time to share it with the class! With your team, you will design and deliver a presentation for your game.

What to Include in Your Presentation

Your Vision

Give a brief synopsis of the game and an overview of the player's experience:

- What does a player experience and feel when playing the game?
- Describe why you came up with this game idea and who you think the game will appeal to.

Formal and Dramatic Elements

Provide an overview of the formal elements of the game. Describe how the game is structured, including basic game play, player objectives, obstacles, resources, and key rules and procedures.

Describe how the game's dramatic elements, such as its challenges and story (if your game has a story), engage players and make the game appealing.

Art Style

Present your game art and explain how the art style supports the game's vision and purpose.

Demonstration of Game Play

Have one or more teammates demonstrate the game by playing it for a minute or two while another teammate describe what's happening in the game.

Appeal

Describe why people will be interested in playing your game.

Assessment Checklist 6:
Unit Project—Presentation

Use this checklist to help you plan and assess your presentation. Make sure that you include all the required components. Your teacher will use this checklist to help evaluate your work.

Requirements	Percentage of Total Grade	Comments	
Presentation		**Student Comments**	**Teacher Comments**
Clearly and concisely describes the game's concept, the player's experience, and the game's formal and dramatic elements.	**20%**		
Demonstrates why the game will appeal to and engage players.	**20%**		
Demonstrates how the game art supports the vision and purpose of the game.	**20%**		
Presents a clear demonstration of game play.	**20%**		
Successfully answers audience questions.	**20%**		
Total	**100%**		

Appendix A: Game Development Software

The following list describes game development software programs that your students can use to create games, roughly ordered by the complexity of the software. Note that software versions, platform compatibility, and availability can change frequently. Go to the manufacturer's Web site for the most up-to-date information.

Gamestar Mechanic

Web site: http://gamestarmechanic.com

Platforms: Online tool, can be used on both PC and Mac

Available for free? Available in both a free version and a premium version

Can the software be used to introduce principles of programming? No

Description: Gamestar Mechanic is a "game-based digital learning platform" that allows students to build their own games as well as learn about game design and systems thinking. Students first use Gamestar Mechanic to play a "quest" that introduces them to principles of game design and teaches them how to use the program to design and publish their own games.

The game-creation tool is a visual drag-and-drop interface that is easy to learn. Students are limited in the kinds of games they can create (2-D top-down or platformer games), and they can't use their own art. They can control some game variables, such as gravity. Students can publish completed games in a section of the Gamestar Mechanic Web site called "Game Alley," where the games can be played and rated by other users.

Gamestar Mechanic is a good choice if you want students to focus on learning the principles of game design instead of or before learning about programming. Note that the language and visuals of the quest are geared toward a younger than high school-age audience; however, the quest does teach fundamentals of game design, and the game-creation tool is sophisticated enough to be used by high school students. Gamestar Mechanic also hosts game design competitions—you may want to organize students' work during the unit around such a competition.

Kodu

Web site: http://fuse.microsoft.com/project/kodu.aspx; http://planetkodu.com/

Platforms: PC; X-Box 360

Available for free? Yes

Can the software be used to introduce principles of programming? Yes

Description: Kodu allows users to design 3-D games. Kodu uses a simple icon-based language that is easy to learn but still has the potential to produce relatively complex games. Users begin by creating a 3-D world with topographical features, such as hills, valleys, and lakes, using tools in the software. They then add characters and objects to the landscape and program the characters using Kodu's icon-based language. The language is event-driven, and each line of code starts out with a "When" condition (e.g., "when the up arrow on the keyboard is pressed"), followed by "Do" conditions (e.g., "the Kodu character moves north"). How characters and objects are programmed determines the rules of the game and how players win or lose. Students can't use their own art.

Students just beginning to use Kodu can undertake a series of Challenges in which they have to complete a task. This process teaches them something about how the software and programming work. There are also sample games included, although some may require the use of X-Box controllers. Students can post their completed games to the Planet Kodu Web site or share games through X-Box Live.

Kodu is a good choice if you have PCs or X-Boxes and want students to get a basic sense of how programming works but still use icons rather than language. It's also a good choice if students want to create 3-D games. Note that creating games in Kodu will take longer than creating games in GameStar Mechanic, because the world has to be created from scratch and characters have to be programmed from scratch.

Scratch

Web site: http://scratch.mit.edu/

Platform: PC and Mac

Available for free? Yes

Can the software be used to introduce principles of programming? Yes

Description: Scratch is a programming language and software program developed by the MIT Media Lab. It is designed to give elementary, middle, and high school students (as well as others) an easy way to create media projects,

such as animations, interactive stories, and games. The Scratch language uses a combination of visual and verbal elements. To create a game or other project in Scratch, students put objects (called *sprites*) on a "stage" that is divided into an *x-y* grid. Students then program the sprites using scripts, which are created by snapping together a series of blocks that control different aspects of the sprite, such as moving and sensing. Blocks will only snap together if the syntax is correct. Students can input variables, such as the number of steps an object moves and in what direction. Students can import art and sounds that they or others have created.

There are some tutorials available on the Scratch Web site, and others generated by teachers that are available at the ScratchEd Web site (http://scratched.media.mit.edu/). However, Scratch is designed in such a way that students are encouraged to explore or experiment and to learn by doing. There is also a large community of Scratch users who upload projects to Scratch—students can download projects, look at and learn from scripts, and modify scripts to create "remixes."

Scratch is a good choice if you want to give students the experience of working with a programming language, want them to use their own art in their games, and want to encourage them to explore and learn on their own. Scratch games will take longer to make than games in Gamestar Mechanic, and may or may not take longer than creating games in Kodu, depending on the complexity of the game. Keep in mind that Scratch is not designed specifically as a game-creation platform, so students may need to experiment quite a bit to figure out how to get the language to do what they want it to do. It may be especially useful for students to see scripts from other people's existing Scratch games.

Game Maker

Web site: www.yoyogames.com/gamemaker

Platform: PC and Mac

Available for free? Free with limited functionality; full version costs money

Can the software be used to introduce principles of programming? Yes, particularly if you introduce the built-in programming language

Description: Game Maker is game development software that allows the user to create 2-D games. Basic game creation works via a series of dialogue boxes containing buttons and drag-and-drop boxes, rather than through a programming language (although a programming language is built into the software and can be used by more advanced users). Games take place in one or more rooms whose attributes are defined by the user. The user first loads resources, such as images (called *sprites*) and sounds, into the game, and then creates objects that can be associated with specific resources. The user then programs the object by defining events that happen in the game (e.g., an object

hitting another object), and actions that take place when those events occur (e.g., the object moves in a specific direction, or the game ends). Users can import their own art and sound files.

Game Maker is a powerful tool for creating different kinds of games of varying levels of complexity. However, the software has a less intuitive interface than the other programs listed, and it can take a long time to create a game. There are tutorials built into the Help menu of the game, as well as tutorials on the Game Maker Web site. Students may also find it useful to look at how already existing games are created (by looking at the games posted in the forums on the Game Maker Web site).

Game Maker is a good choice if you want students to build more complex 2-D games, are working with more advanced students, and/or have additional time to teach the unit.

Commercial Game Development Software

If you are working with more advanced students and have additional time to teach the unit, you might think about having them use commercial game development software to build their games. Note that these programs are considerably more complex to use; students will need to spend longer both learning the programs and building their games, and you will need to take time to familiarize yourself with the program you choose. You may also need to put together teams of students with different skill sets (such as programming or creating game art) to create a well-rounded development team. Some software packages must be purchased, although some are available at no or reduced cost to educators.

Adobe Flash (2-D development tool)
www.adobe.com/products/flash/

Unity (3-D development tool)
http://unity3d.com/

Appendix B: Video Game Genres

There are many types, or genres, of video games. In competitive games, a player competes against other players or against the game in order to win—or to achieve what's called the *victory condition*. In cooperative games, all players work together to achieve the victory condition. And some games have no victory condition—rather than try to win, players set their own goals or use the features to explore the game world.

Most games can be categorized under one of the genres below, though some games might not fall under any of these genres and some might fall under more than one.

Puzzle Games

In puzzle games, the core mechanics center around the completion of a logical, spatial, language, or other type of puzzle. For example, in *Tetris*, the player ponders a simple spatial puzzle, arranging shapes composed of blocks to complete finished lines.

Examples: *Puzzle Quest*, *Plants vs. Zombies*

First-Person Shooter Games

Two key characteristics define these games. The first is that the camera is directly embedded at the eye level of the player's *avatar* (electronic image), giving the player a "first person" perspective. The second is that the player's primary interaction with the world is through the collection and application of weaponry (hence the word "shooter").

Examples: *Borderlands*, *Jet Force Gemini*, *Wolfenstein 3D*

Action Games

Action games put players into exciting, action-based roles, engaging them in combat, acrobatics, super powers, or other sets of reflex-based interaction in a fictional environment. These games often use an "over the shoulder" camera, or "third person" perspective, to allow players to see their avatars in the environment.

Examples: *Dynasty Warriors: Strikeforce*, *Devil May Cry*

Role-Playing Games

The strict definition of a role-playing game is one in which the player takes on a rich identity in a game world and explores the world through that perspective. The genre, however, also includes games that use number-based statistical systems (for example, strength, hit points, and weapon damage) to evaluate the player's capabilities. Players cycle through adventures to increase their "stats" and tackle stronger opponents.

Examples: *Dragon Age*, *Ultima IV*

Massive Games

Massive games are played exclusively online, where players log into a large, shared, and persistent world. This world exists for other players even when you aren't playing, and special events and interactions occur whether you are logged in to the experience or not. Massive games are often developed as role-playing games called *massively multiplayer online role-playing games*.

Examples: *World of Warcraft*, *Runescape*, *EVE Online*

Real-Time Strategy Games

Real-time strategy (RTS) games usually involve the control of a group of military units, where battlefield commands and maneuvers define the strategy. These games also often involve managing and producing resources; players fight over and control these resources, which can then be turned into more units or upgrades to existing units. The "real time" component of RTS refers to the fact that the game does not pause to allow you to consider your next move, and players must make tough decisions about which components of their teams to attend to at any given time.

Examples: *Dawn of War II*, *Sins of a Solar Empire*

Turn-Based Strategy Games

Turn-based strategy games are similar to RTS games but allow players to consider all of their options. These games are often more detailed in their mechanics and lean toward historical accuracy or simulation-like modeling of the game's world.

Examples: *Civilization IV*, *M.U.L.E.*

Racing Games

In these games, players control a vehicle and compete in a race. The games range from simulation racing to more outrageous "kart" style racing, but all involve players using their reflexes and the vehicle's capabilities to get ahead of the pack.

Examples: *Wipeout HD*, *Gran Turismo*

Sports Games

These games re-create a particular sport. They generally reference a set of rules from a real-world game to build their structure. Interestingly, in many sports games, the player controls a team from the viewpoint of someone watching sports on TV, rather than from a first-person perspective or other viewpoint.

Examples: *Blood Bowl*, *Madden NFL 10*

Platformer Games

Platformer games involve exploration puzzles that require the player to use well-timed jumps or other acrobatic abilities to navigate a challenging environment. These games have their roots in 2-D (side-scrolling) classics, but have moved on to include games developed in 3-D space as well.

Examples: *Tomb Raider*, *Braid*

Adventure Games

Adventure games are an old and venerable genre, with their roots in the earliest text adventure games, before graphics were feasible for gaming. Adventure games are generally narrative-driven, placing the player in a story. While exploring the game's world, the player acquires inventory objects, which can be combined and used with objects in the game's environment in order to solve puzzles. Solving these puzzles allows the player to continue exploring and move the narrative forward.

Examples: *The Neverhood*, *Tales of Monkey Island*

Fighting Games

Fighting games pit characters against one another in martial combat. They are often two-player games or one-player games with computer artificial intelligence substituting for the second player. The player uses a specific fighter's array of special moves and combinations to defeat opponents. To win, players need a deep understanding of the other character's capabilities, strong pattern recognition skills, and lightning reflexes.

Examples: *Soulcalibur IV*, *Samurai Shodown*

Rhythm Games

Players take on the role of musicians and perform beat-matching interactions that parallel a component of music in order to win. These games often feature peripheral controller devices that emulate real-world instruments.

Example: *Guitar Hero*, *Dance Dance Revolution*

Appendix C: Game Design Challenges

Assigning and Presenting Design Challenges

You can have students apply what they are learning about games to solve design challenges, several of which are suggested below and in the handout that follows. Notes in activities throughout the unit indicate when these challenges are appropriate. Students can work on design challenges in pairs or in larger teams.

Also provided is a handout with a design challenge protocol that students can use to pitch their ideas to another team.

> **Note:** Students' design ideas and pitches provide good opportunities for formative assessment.

Additional Design Challenge Ideas

In addition to (or instead of) the design challenges on the handout, you can use the following ideas:

- Create a "non-shooting" first-person shooter. Use the gaming conventions of a first-person shooter (where the player sees the game world through the eyes of a character, directs projectiles at targets, and moves a character through a physical environment) to design a game in which the player has a different objective than shooting people or creatures.
- Design a game in which a sport (e.g., baseball or hockey) is played in a new environment. For example, play golf on the moon or on a series of different planets. Describe the effect that the new environment has on the game play. For example, tell how the moon's lesser gravity would cause the golf ball to travel a greater distance.
- Design a game that is a sequel to an existing video game. Describe how the game play is similar to and different from the existing game.
- Design a game that will appeal to teenage girls.
- Design a game based on a children's book.
- Design a game set in your high school.
- Take a familiar game and change its boundaries. How does that affect the play experience?
- Design a game that focuses on players progressing from point A to point B. The first player to reach point B wins.
- Design a game in which the player who acquires all the territory wins the game.
- Take the mechanics of walking toward an object and picking it up, and make a game out of it.

Handout: Design Challenges

Design Challenge #1: Child's Play

Choose a simple game that you played as a child, such as Tag, Duck Duck Goose, or Tic-Tac-Toe. Work with a partner to come up with an idea for a video game based on this children's game.

As you consider ideas, think about the following elements of the original game and how you will recreate or adapt those elements for your video game:

- **Objective:** What is the game about? What does the player try to accomplish during the game?
- **Conflict:** What obstacles in the game make it challenging for the player to reach the objective?
- **Target audience:** Who does the game appeal to?
- **Fun:** What makes the game fun? What aspects of the player experience in the original game do you want to recreate in the video game? What aspects will need to be different?

Prepare a two-minute pitch of your game that includes a description of your game concept, who the game appeals to, and why the game appeals to that audience.

Design Challenge #2: Improving or Adapting the Game

Choose and complete one of the challenges below. Then prepare a two-minute pitch of your idea that includes the following:

- A brief description of the new game concept
- A description of who the game appeals to and why

Challenge: Improving the Game

Consider the strengths and weaknesses of the game you reverse-designed. Change up to five of the game's formal or dramatic elements in order to address its weaknesses. (For example, you might choose to change the objective, a rule, the player interaction pattern, a source of conflict, or the story.) Describe how your proposed changes would affect the game play and the game's appeal.

Challenge: Adapting the Game

Come up with a nondigital game idea that is a version of the game you reverse-designed. Think about the core mechanics of your game. In your design, consider the following questions:

- What is the main player objective(s) in the game?
- What makes the game challenging and fun? How would you translate that core idea to a board game, card game, or other nondigital game?
- Why would this game be fun to play?

Design Challenge #3: Interface Design

Choose one of the interface design challenges below. Develop a two-minute pitch of your idea to present to classmates.

Interface Challenge #1

The makers of *Dance Dance Revolution* want to expand their current market. Markets they'd like to target include senior citizens, children with disabilities, sports fans, animal lovers, and stay-at-home parents. They want you to take the game's existing hardware—the dance pad—and come up with two different uses for it, each of which targets a different market.

Interface Challenge #2

Design a game controller that interfaces directly with the body. For example, you might design a wearable glove that transmits the wearer's hand movements to the game console. Draw a sketch showing how the player uses the controller, and describe two ways that the controller could be used during game play.

Interface Challenge #3

Come up with a unique manual interface that could be used as an alternative manual device for one of your favorite games. (Your only restriction is that it can't be a gun or other weapon for a first-person shooter game.) Describe how this interface would change the game. Consider the following questions in your design:

- How would players control actions differently?
- Would this interface change the game play at all? Why?
- How would this alternative interface make the game more enjoyable?

Interface Challenge #4

A gaming company is designing a new car racing game and wants your help in designing the user interface. In the game, players race against one another on an obstacle course, competing for the best time. Your tasks:

- Decide what information the players should see in the onscreen user interface.
- Design and draw what the interface looks like.
- Explain why this game would be fun to play.

Handout: Design Challenge Pitch Protocol

Now that you've come up with a great new game design idea, you'll pitch the idea to another game design team to get some feedback. Use the following steps to pitch your game design and listen to the other team's pitch.

Step 1: Two-Minute Pitch

The first team takes two minutes to pitch its idea to the listening team and convince them that the idea is a good one.

Step 2: One-Minute Question Generation

After hearing the pitch, the listening team takes one minute to come up with at least one question to ask about the pitch. The team might ask, for example:

- Clarifying questions about game play
- Questions about why the team made certain design choices
- Questions related to audience appeal
- Questions on another topic the team is curious about

Step 3: Two-Minute Q&A

The listening team asks its question(s), and the pitching team provides answers.

Step 4: One-Minute Reflection

The listening team reflects on the pitching team's game design idea and gives feedback on the design. Feedback might include, for example:

- Aspects of the game design that are successful
- Aspects of the game design that could use improvement
- Suggestions for changes to improve the game design

Step 5: Two-Minute Feedback Session

The listening team takes two minutes to share its feedback with the pitching team and answers any questions or thoughts the pitching team may have about the feedback.

Step 6: Switch Roles and Repeat

The team that had been listening in the first round pitches its game design idea while the other team listens, following Steps 1–5.

Appendix D:
Physical Prototyping Activity

If your students are not using game development software to create video games, you can instead have them create physical prototypes of the video games that they've designed.

Students first learn about the prototyping process by reverse-prototyping a game and then create prototypes for their own games. Students follow the procedures from Activity 3E.3 and 3E.4 for play-testing their prototypes and revising their game design documents.

Advance Preparation

- Before Activity D1, choose a video game to use as a model for how to reverse-prototype. A sample prototype for the game *Plants vs. Zombies* is provided. Alternatively, you can use a game that students reverse-designed in Activity 2A.
- During Activity D2, students build a physical prototype of their game. Collect and/or have students bring craft materials (such as cardboard and colored paper), household objects (such as matchsticks, straws, thin blocks, and coins), and pieces from existing board games to use for building their prototype. Large sheets of graph paper or chart paper are particularly useful for creating game boards or maps. Students should bring in only small household objects and materials that don't need to be returned.

Sequence

D1: ***Introduction to Prototyping***	Students learn about the purpose of and process for building a prototype for a video game.
D2: ***Building a Prototype***	Students build a physical prototype of their game, using pen and paper and other physical materials.

Materials Needed

- **Handout D1: Prototyping**
- Video game (see *Advance Preparation*)
- Materials for building physical prototypes (see *Advance Preparation*)
- **Handout D2: Building Your Prototype**
- **Handout D3: Sample Prototype: *The Ghostly Maze***

D1: Introduction to Prototyping

1. Introduce the prototyping activity.
Distribute **Handout D1: Prototyping** and tell students that they will use this information to build a physical *prototype*—a playable model—of their game.

> **Note:** Students may be interested to know that many small gaming companies still build paper prototypes at the beginning of the design process.

Ask students:

- What do you think is the purpose of prototyping a game?

  Possible answers: *To see if the game is fun; to test game mechanics before spending time and money on programming and creating art; to get ideas for improving or adding to the game.*

- Why build a physical prototype of a video game?

  Possible answers: *A physical prototype can be built more quickly and at less cost than a digital prototype; simple materials are easier to acquire and work with.*

Teacher's Notes: Prototyping

Handout D1 describes the challenges of and limitations to building physical prototypes, especially for first-person shooter games or other action games. While a physical prototype doesn't allow you to test all aspects of games, if constructed well, it can help you explore and test some aspects of the playing experience of *any* video game.

You may want to give students an overview of the prototype-building process:

1. Identify the game's core mechanics and choose an element to test.
2. Decide how to build a game world and represent essential characters and objects.
3. Discuss whether adaptations are needed, such as using cards or dice to represent the occurrence of random events.

2. Discuss and model how to create a physical prototype of a game.
Tell students that to help them understand how to build a prototype, the class is going to reverse-prototype an existing video game.

Demonstrate how to play the video game you selected.

Discuss how to build a prototype for the game, using the information given on Handout D1 in the section How Do You Build a Physical Prototype?

Teacher's Notes: Sample Prototype: *Plants vs. Zombies*

Below is a description of how a physical prototype of the second level of the game *Plants vs. Zombies* might be constructed.

Game-Play Mechanics
Test how many zombies can be released, and at what intervals, to make the game challenging enough to be interesting but not so challenging as to be frustrating. Other variables to test might include the rate at which sunflowers produce sunlight, the length of time it takes seed packets to recharge, or the length of time it takes peashooters to kill zombies.

The basic "currency" of the game is sunlight. The player can take three actions:

- Collect sunlight that falls from the sky or from sunflowers. Sunflowers produce sunlight at specific intervals. Each unit of sunlight is worth 25 points.
- Use sunlight to "buy" and plant sunflower seeds. Each sunflower seed costs 50 points of sunlight (2 units of sunlight).
- Use sunlight to "buy" and plant peashooter seeds. Peashooters shoot peas at the zombies. If enough peas hit the zombies, the zombies are killed. Each peashooter seed costs 100 points of sunlight (4 units of sunlight).

Seeds take a specific amount of time to recharge—and while they're recharging, the player can't purchase additional seeds, even if he or she has enough sunlight to do so.

Zombies move across the lawn on their own or as part of a pair (two per square).

Game World

- Lawn: A grid of green squares, three rows of nine squares each; each square can hold one plant

- Lawn mowers: Blue squares, one per row, placed on the west side of the lawn (opposite where zombies attack from)
- Seed area: Two stacks of plant seeds (sunflower and peashooter plants); players purchase seeds here and move them onto the lawn grid
- Sunlight meter: A separate area with a stack of sunlight; players add to the stack as they collect sunlight

Characters and Objects

- Sunflowers: Yellow paper circles
- Peashooters: Green paper circles
- Zombies: Pennies
- Sunlight: Red paper circles
- Seed packet that is recharging: Black paper squares covering a stack

Adapted Procedures and Rules

Use a metronome-based system to recreate the game play. First, decide on the following:

- The interval of time at which sunlight falls from the sky
- The length of time it takes a seed packet to recharge once a seed has been purchased
- The intervals of time at which sunflowers produce sunlight
- The total number of zombies attacking the lawn
- The interval at which zombies attack, the row in which they attack, and whether they attack alone or in a pair (larger waves of zombies can attack toward the end of the level)
- The speed at which zombies move across the lawn (e.g., two seconds per square)
- The length of time (in number of squares moved by the zombie) it takes a peashooter to kill a zombie (for example, a peashooter would take eight seconds, or four squares moved, to kill a zombie that moves at the rate of two seconds per square)

To build the prototype, set the metronome to click once per second. Give players 50 points of sunlight to start, enough to purchase one sunflower seed. (Place two red paper circles representing two units of sunlight in the sunlight meter.)

The player performs the same tasks as in the video game:

- Collecting sunlight, by picking up units of sunlight on the lawn (from the sky or produced by a sunflower) and placing them in the sunlight meter area
- Purchasing and planting seeds, by removing units of sunlight from the sunlight meter, giving them to the student in charge of seed

purchase and recharging (see below), and placing the seeds in a lawn square

Students control the rate of game play, each responsible for controlling a different game variable. For example:

- *Sunlight falling from the sky:* At the specified intervals, a student places a red paper circle on the lawn, which can then be collected by the player.
- *Sunlight produced by sunflowers:* At the specified intervals, a student places a red paper circle on top of the sunflower that produced it. (This can get complicated if the player plants several sunflowers, so more than one student may need to be responsible for this variable.)
- *Seed purchase and recharging:* A student collects the units of sunlight (red paper circles) from the player and gives the player the requested plant seed (yellow or green paper circle). The student then places a black paper square over the stack of plants from which the seed was purchased for the predetermined amount of time. This indicates that the seed packet is recharging and that seeds can't be purchased. The student removes the black paper square from the stack of plant seeds at the end of the time period, indicating that seeds can again be purchased.
- *Zombies:* One or more students moves the zombies (pennies), singly or in a pair, onto the lawn at the predetermined intervals and continues moving them across the lawn toward the house at the predetermined speed.

If the player has planted peashooters (green paper circles) in a row, the student removes the zombie (penny) from the lawn once it has been "killed" (after it has moved the appropriate number of squares).

If the zombie eats a plant (see below), the student removes the plant from the lawn.

Additional rules of the game, adapted as necessary, are as follows:

- If a zombie reaches a plant (a sunflower or a peashooter) before being killed by a peashooter, the zombie "eats" the plant, and the plant is removed from the lawn.
- If there are two peashooters in a lawn row, the zombies are killed twice as quickly; if there are three peashooters, zombies are killed three times as quickly; and so on.
- If there are two zombies in a lawn row, the peashooter can't begin to kill the second zombie until the first zombie is dead. This is true whether the zombies are approaching alone (one per square) or in a pair (two per square).

- When a zombie first reaches the left side of a lawn row and is about to reach the house, the lawn mower (blue square of paper) is activated, which kills all the zombies in that lawn row. The mower can only be activated once in each row.
- If a zombie reaches the west side of a lawn row and there is no mower to stop it, it has reached the house, and the player loses the game.
- If the player kills all the zombies without any of them reaching the house, the player wins the game.

3. (Optional) Have students build the prototype you discussed.
If time permits, have students construct the prototype you modeled. Form teams and assign them different parts of the game to build. For example, with *Plants vs. Zombies*, have one team construct the green lawn to use as the main game board, while other teams create the objects to use as sunflowers, peashooters, zombies, and sunlight.

Assign other students the elements of game play, such as determining the rate that sunlight falls from the sky or the rate at which zombies enter the lawn.

Once the prototype is ready, have the class test it to determine if it is playable.

4. (Optional) Have students change variables in the prototype.
Have students experiment with using the prototype to change variables in the game. For example, with *Plants vs. Zombies*, have students test how many zombies are released and at what intervals. Then have students play the game again and see what effect this change has on how challenging and/or fun the game is.

Note: Make sure that students change only one or two variables at a time to determine the effect on game play.

Handout D1: Prototyping

What Is a Prototype?

A *prototype* is a working model of your game idea. It allows you to test whether the game is functional, feasible, and fun. It also allows you to make changes to your game.

Game designers make both digital prototypes and physical prototypes. You are going to make a physical prototype—using craft materials and basic household objects.

Why Build a Video Game Prototype Out of Paper?

Video game developers—especially small companies—make paper prototypes because they are inexpensive and can be built quickly. Paper prototypes also allow game designers to test aspects of a game before spending time and money on programming and creating game art.

How Do You Build a Physical Prototype?

Focus on Game-Play Mechanics

Your purpose in building a prototype is to test some or all of your game's *mechanics*—what the player does and what happens to the player during the game. Some game-play mechanics you might want to test are fighting an opponent, escaping an enemy, searching for treasure, or solving puzzles. Before you build your prototype, decide which of the game's mechanics you're going to focus on.

Keep It Simple

Try not to be concerned with perfecting the look of the game. Colors or art details are not important in a prototype. You want to represent important aspects of your game world (i.e., its characters and objects), but what they look like is not the primary focus now. (Stick figures are fine!)

Start by Building the Game World

Think about how the player or character moves through the game world. Identify the important characteristics of the game environment. For example, is there a path with obstacles? Is there an open area that the player can move through in any direction? Are there locked gates or hidden treasures?

You can use a large sheet of graph paper to make your game board or the map of your game world. You can also draw your own grid on a sheet of chart paper. Using a grid can help you control how far and how fast a character moves within the game world.

If your game world includes walls, consider using objects to represent the walls that can easily be repositioned on the grid. It will be easier to adjust the game world after play-testing. Matchsticks, straws, cardboard, or thin blocks work well for walls.

Represent Essential Characters, Units, and Objects

Choose the characters and objects that you want the play-testers to see and use in the game. Represent your characters and objects with pieces from real board games, coins, or other small household objects. You can also use different-shaped pieces of colored paper. If you are using a grid for your game, it will be helpful to have your characters and objects fit within one cell on the grid.

Make Necessary Adjustments to Game Rules

Here is the trickiest part of making a physical prototype of a video game: In order to recreate the *playing experience* of your video game, you may have to make some changes in the game's rules and procedures.

For example, suppose that in your video game a player moves along a path and randomly encounters monsters and finds treasures. In the digital version, you would program the game so that the monsters appear at different times each time you play the game. With your physical version, in order to test *what it feels like* for a player to randomly encounter monsters and treasures, you'll have to adapt the game so that the player can experience these random events.

Use Cards or Dice to Represent Chance

Suppose there are 10 possible events that could happen to a player. You can make 10 different event cards or use a 10-sided die along with a written key that tells what each card or dice roll means. If one event is supposed to occur more often than others—for example, if the player should encounter many monsters and few treasures—you can just make more cards for that event.

It may feel like you're inventing a new game by adding cards to represent random events, but remember that you're testing the *playing experience*, not the game technology.

Simulate Moving and Shooting

You can also use cards, dice, and turn-based rules to recreate the feeling of chasing, being chased, and shooting.

Here's an example of how to prototype a game that focuses on movement and shooting:

- Use a metronome (available free online) to control when players can move. Set your metronome to tick once every five seconds. Make a rule that a player can move one grid on the game board with each tick. When there is a line of sight, a player can take a shot at another player or a monster, but a player has only one shot per metronome tick.
  OR:
- Create several copies of each of the following cards:
  - Move one space
  - Move two spaces
  - Turn any direction
  - Shoot

- Have the game proceed as follows:
  1. Players place their characters on a cell grid and choose cards. Each player chooses three cards and places them face down in a stack.
  2. Reveal: Each player turns over his or her top card.
  3. If anyone turned over a "shoot" card, that person "fires" in the direction that his or her character is facing. Follow an imaginary line across the grid. If the line intersects with a cell containing another character, the shot hits. If the line comes to a wall or does not encounter another character, the shot misses. Shots can occur simultaneously, so that two or more players can be hit at the same time.
  4. If anyone turned over a "turn" card, that person can turn his or her character in any direction. If two or more players reveal turn cards, roll a die to determine who turns first.
  5. If anyone turned over a "move" card, that person moves his or her character the number of spaces specified. If two or more players reveal move cards, roll a die to determine who moves first. Players cannot occupy the same cell.

You might also add a scoring system and determine a hit percentage—that is, how many hits it takes before a character "dies."

Stay True to the Game

Make your rules as similar as possible to the rules for the digital version of the game. Change or add rules only when it's necessary to recreate an important part of the playing experience.

D2: Building a Prototype

1. Introduce the prototyping activity.
Distribute **Handout D2: Building Your Prototype** and **Handout D3: Sample Prototype: *The Ghostly Maze***. Go over with students the steps they will take to prototype their game. Answer any questions students may have.

2. Have students brainstorm play-testing questions.
Point out to students that before they build their prototype, they should come up with questions that they want their play-testers to give them feedback on. Tell students that these can be a mix of general and specific questions. Have the class brainstorm some questions they may want to ask their play-testers.

Teacher's Notes: Questions for Soliciting Play-Test Feedback

General questions might include the following:

- Is the game fun to play?
- Were any parts of the game confusing?
- Is there any additional information that would have been useful to have while you were playing the game?

Specific questions will vary according to the type of game students are designing, but may include questions about the size and shape of the game world, the amount of luck and/or strategy required to play the game, and the amount and balance of obstacles and rewards (e.g., Are there enough enemies or monsters? Too many?).

3. Have students build their prototype.
Gather the materials that you and students have collected, and give teams time to construct their prototype.

> **Note:** Building the prototypes may take more than one class session, so you may want to provide space for students to store their works in progress.

Have students create a handout to give to their play-testers. Handouts should include the rules and procedures that players need to know in order to play the game.

4. Have students play-test games and revise game design documents.
Follow the steps in Activity 3E.3 of the unit and have teams play-test one another's games. Continue to follow the steps in Activity 3E.4 to have students incorporate the feedback they've received into their game design, revising only the game design document.

Handout D2: Building Your Prototype

Work with your team to complete the steps below to build a prototype for your game.

Step 1: Plan Your Prototype

A carefully planned prototype can help you focus on the features you'll want to play-test in your game. Play-testing, in turn, will give you feedback to refine and improve the game.

Answer the questions below to help you plan your prototype.

Mechanics	
What is the core mechanic of your game? What do players spend most of the game *doing* (for example, chasing, being chased, solving riddles, engaging in combat, searching for treasures)? Which mechanic(s) do you want to focus your prototype and play-testing on?	
Feedback Questions	
What questions do you want to ask play-testers in order to get feedback about your game? Brainstorm a mix of general and specific questions. (You will narrow this list after you build your prototype. For now, include all the questions that your team comes up with.)	

Game World	
Describe how you will build your game world. What features will you include on your map or game board (for example, paths, walls, hidden rooms)? What materials do you need to build the game world?	
Characters and Objects	
What important characters, units, and/or objects do you want to represent in your prototype? What materials will you use to represent them?	

Step 2: Build Your Prototype

Gather the materials to build your prototype. Build the game world and the important characters, units, and/or objects.

Step 3: Adapt Procedures and Rules as Necessary

Determine the process that play-testers will use to play the game. You may need to adapt or create new rules in order to make the prototype game playable.
Create a handout for your play-testers that includes the following:

- Rules that play-testers need to know in order to play the game
- Procedures that your play-testers should follow in order to play the game

Depending on your game, the handout might include, for example:

- Adapted Procedures for Movement
- Adapted Procedures for Interacting with Other Players
- Game Designers' Roles During Game Play

Handout D3:
Sample Prototype: *The Ghostly Maze*

Planning Your Prototype

Mechanics	
What is the core mechanic of your game? What do players spend most of the game *doing* (for example, chasing, being chased, solving riddles, engaging in combat, searching for treasures)?	***Players spend their time moving their character through the path of the maze, avoiding ghosts and picking up apples.***
Which mechanic(s) do you want to focus your prototype and play-testing on?	***The number of ghosts and pieces of apples (including candy apples that restore health) to include in the game in order to make the game fun and give it an appropriate level of challenge.***
Feedback Questions	
What questions do you want to ask play-testers in order to get feedback about your game? Brainstorm a mix of general and specific questions. (You will narrow this list after you build your prototype. For now, include all the questions that your team comes up with.)	***Did you have fun playing the game? What aspects of the game were fun?*** ***What aspects of the game were challenging? Was the game challenging enough but not too challenging? If not, what should we change?*** ***Were there too many, too few, or the right number of apples to pick up?*** ***Were there too many, too few, or the right number of ghosts in the maze?*** ***Were there too many, too few, or the right number of candy apples?***

Game World	
Describe how you will build your game world. What features will you include on your map or game board (for example, paths, walls, hidden rooms)? What materials do you need to build the game world?	*The game world is the maze, and it will be made on a sheet of brown construction paper. We will use black markers to mark off walls to create paths within the maze. We will also section the paths in the maze into squares, one inch per square. The apples and ghosts will be distributed on different squares throughout the maze.* *Construction paper, markers*
Characters and Objects	
What important characters, units, and/or objects do you want to represent in your prototype? What materials will you use to represent them?	*The player's character, the ghosts, and apples (including candy apples).* *To represent the player, we will use a small male or female toy figure. We will make ghosts out of pieces of white construction paper. We will use circles of red paper to represent the apples, and circles of yellow paper to represent the candy apples.* *The player's health meter will be represented by a white strip of paper divided into three sections. Each section contains one candy apple (represented by a yellow circle of paper) at the beginning of the game.*

Adapted Procedures and Rules

Adapted Procedures for Movement

- Use a metronome to control the movement of the player's character and the ghosts. Set the metronome to tick once per second. Each second is one "turn."
- Use a stopwatch to indicate the amount of time the player has to collect the candy and reach the maze's exit (this amount of time is a variable that can be changed by the game designers).
- On each turn, the player can move one square in any direction.
- The player collects apples by landing on a square and picking up the apple.
- The ghosts (controlled by the game designers) move one square per turn.
- If a ghost lands on the same square as the character, the character loses one piece of health and must remove a piece of candy corn from the health meter.
- If the player lands on a square that has a candy apple, one bar of health is restored (the player removes the candy apple from the square and puts it onto the health meter). If the player already has three bars of health, the candy apple is discarded.

Game Designers' Roles During Game Play

- One game designer monitors the metronome and the stopwatch.
- Other game designers move the ghosts through the maze. Depending on the number of ghosts, each designer may control more than one ghost. The ghosts move in set patterns established before the game starts (for example, moving back and forth over a limited number of squares, or chasing after the player's character).

Appendix E: The Career Profile Project

What's it really like to have a career working in the arts, media, and entertainment (AME) industry? What education and training path gets you there? And what does the work of a talented AME professional look like?

For this project, you'll answer these questions by focusing on a successful professional who works in audio, video, animation, or gaming. You'll research the professional's career, education, and training, and analyze a clip from a production that this person has worked on. Your final step will be to present what you've learned to your classmates.

Step 1: Choose an AME professional.

Pick an AME field that you are interested in, such as audio, video, animation, or gaming, and select a professional working in that field. You can take one of three approaches to choosing this person:

- **Think of a media production that you like** (e.g., a movie or game) and choose someone who worked on it—the director, animator, lead artist, cinematographer, level designer, or producer.
- **Choose a professional whose work you admire.** Be sure to choose someone who works on media production, rather than a performer.
- **Choose someone you know personally or someone in the community** who works in this field.

Start with two or three professionals and conduct research to see how much information you can find—work samples, education and career paths, or interviews. Check to see if there are Web sites with clips of their work. (This is especially important for gaming and animation, since it can be hard to pick out an individual's contribution to finished games and animated movies.)

Narrow your choice to one professional by asking yourself the following:

- Does this professional work on media productions that I admire and want to watch, play, or listen to?
- Is there enough information available about this professional's career for me to complete the project?
- Has the professional had an interesting or instructive career path?

Step 2: Find out about the professional's education and training.

Look online or in books or magazines to find out:

- What college (if any) did this person attend?
- What other training has this person pursued (e.g., technical training)?

Write a short paragraph about your professional's education and training.

Step 3: Find out about the professional's career path.

Conduct research to learn about the path your professional has taken:

- How did your professional begin his or her career?
- What jobs or education has your professional taken or completed to get to his or her current position? Does your professional have further work or career goals?
- What media productions has your professional worked on, and what role did he or she play on each? List them in chronological order.
- Has your professional been interviewed or has he or she written about what it's like to work in this field? If so, what has your professional said?

Write a paragraph describing your professional's career path. Create a timeline that includes the following:

- Major career milestones
- Media productions the professional worked on

Step 4: Analyze a media production.

Choose a successful media production that your professional has worked on. Try to find a good example of your professional's contribution—for example, an animator or gaming professional's reel, or a scene with a character designed by your professional.

Analyze a short (10-minute or less) clip from the production:

- What makes this production successful? What visual and/or audio elements work well? What principles (such as the principles of animation or cinematography) are used effectively?
- How does the production make effective use of the elements of art and principles of design? (Disregard this question if you are analyzing an audio production.)
- What role did your professional play in contributing to the success of the production?
- Is there a particular style that can be attributed to your professional? (For example, some animators' work is clearly identifiable.) How is that style expressed in this work?

Write a paragraph analyzing the clip you've selected.

Step 5: Share your profile with your classmates.

Share what you've learned with your classmates, and learn about the professionals they profiled.

Materials Needed

Throughout Unit

- Equipment for playing video games, such as computers with Internet access, hand-held gaming devices, and video game consoles
- Chart paper and markers

Part 1: Introduction to Games

Equipment

- Computers (ideally, one for each student, although students can also work in pairs)

Handouts

- **Handout 1: Unit 2 Overview**
- **Handout 2: Unit 2 Journal Assignments**
- **Handout 3: Instructions for *What's in a Game?***
- **Handout 4: Elements of Games**
- **Handout 5: Weekly Critique**
- **Assessment Checklist 1: Weekly Critique**

> **Note:** Give students extra copies of Handout 5 and Assessment Checklist 1 so that they can complete one handout and one assessment each week.

- **Handout 6: Game Development Worksheet**

Examples of Media Resources

- Several games for students to play (see *Advance Preparation*)
- Optional: List of links to online video games (see *Advance Preparation*)
- Game development software
- Optional: Tutorials, instruction manuals, or handouts about the game development software
- Optional: File of the game that you developed (see *Advance Preparation*)

Items Students Need to Bring

- Optional: Board games, card games, and video games (see *Advance Preparation* at the beginning of the unit)

Advance Preparation

- Before Activity 1A.1, select several games (such as board games, card games, physical-skill games, and video games) for students to play in class. Make sure that there are enough games for teams of three or

four students to each play a game. Choose games that vary in theme, objectives, genre, and platform. Ideally, the games selected should represent a variety of game types. It's okay to use games that students are familiar with, as well as games they may not be familiar with. For unfamiliar games, try to choose ones that students will be able to learn fairly quickly. (See *Media & Resources* for game suggestions.)

Note: A sample analysis of one level of *Super Mario Galaxy* for Nintendo Wii is provided in this activity.

- In Activity 1A.3, students are introduced to the weekly critique assignment, in which they play and critique a game on their own each week. Students may choose board games, card games, physical-skill games, or video games. You may want to provide students with a list of links to online video games. See *Media & Resources* for suggestions.
- Optional: Before Activity 1B, look at tutorials or introductory activities designed by software developers or others to introduce specific game development software to users (see *Media & Resources* for suggestions). Determine which, if any, of these tutorials or activities you will complete with students. Note that these activities may add additional time to the unit.
- Determine the objective of the game that students will create in order to familiarize themselves with the game development software. Here are some options:
  - Moving a character or object from one part of a space to another to reach a goal
  - Moving a character around a wall or barrier to reach a goal
  - Having a character collect one or more resources (such as coins or apples)
  - Having a character shoot one or more enemies
  - Having the player collect objects (moving or not moving) by clicking on them
  - Have the player avoid an enemy for a set amount of time
- Optional: Use the game development software to create a game like the ones students will create. (This way, students can see the game code or what a correctly working game should look like.)

Part 2: Reverse Design

Equipment

- Stopwatches (one for each team) or a clock with a second hand
- Optional: Digital cameras

Handouts

- **Handout 7: Reverse-Design Document**
- **Handout 8: User Interface**

Examples of Media Resources

- Video games for reverse-design project (see Advance Preparation)
- Several video games (see Advance Preparation)

Items Students Need to Bring

- Copies of **Handout 4: Elements of Games**

Advance Preparation

- In Activity 2A, students choose a video game to play and analyze for their reverse-design project. Select an assortment of games in advance for students to choose from. Decide whether your selection will include console and hand-held games, online games, user-generated games, or a combination.
  - Collect or have students bring in a variety of console and hand-held video games.
  - See *Media & Resources* for links to online video games.
  - If your students are using game development software (such as Gamestar Mechanic or Scratch) that provides access to games created by other users, you may want to select examples of these games for students to choose from.

  Be sure to check the games for appropriate content.
- In Activity 2B, students analyze games' user interfaces. Select several different video games for students to play and analyze. Try to choose a variety of game genres and platforms so that students can get a sense of different types of game systems and controls. You can use games students have looked at already (such as games played during Activity 1A).

Part 3: Video Game Design and Development

Equipment

- Optional: Computers with Internet access
- Optional: Computers with illustration software, such as Adobe Illustrator® or Photoshop®
- Drawing materials, such as charcoal and colored pencils
- Sticky notes (several for each student)
- Computers
- Game development software

Handouts

- **Handout 9: Unit 2 Project Description**
- **Assessment Checklist 2: Unit Project—Game Design Document and Wireframes**
- **Handout 10: Giving and Receiving Feedback**
- **Handout 11: Game Design Document Template**
- **Handout 12: Sample Game Design Document: *The Ghostly Maze***
- **Handout 13: Creating a Control Table and Wireframes**
- **Handout 14: The Elements of Art and Principles of Design**
- **Handout 15: Analyzing Game Art**
- **Handout 16: Creating Game Art**
- **Assessment Checklist 3: Unit Project—Game Art**
- **Assessment Checklist 4: Unit Project—Completed Game**
- **Handout 6: Game Development Worksheet**
- **Handout 17: Unit 2 Career Information**
- **Handout 18: Play-Testing**

Items Students Need to Bring

- Copies of **Handout 4: Elements of Games**
- Completed control tables and wireframes

Examples of Media Resources

- Screenshots of images from video games (see *Advance Preparation*)
- Optional: Scripts for user-generated games (see *Advance Preparation*)
- Optional: Tutorials, instruction manuals, or handouts about the game development software

Advance Preparation

- For Activity 3D.1, choose six or seven screenshots from video games that show detailed and image-rich settings and/or close-up images of game characters. Examples should represent a variety of art styles, from realistic to cartoon-like to abstract. (See *Media & Resources* for suggestions.) If there are specific principles of design or elements of art that you want students to learn more about, you may want to show examples or non-examples of these for analysis.

  Note: A sample analysis of *LostWinds: Winter of the Melodias* is provided in this activity.

- Before Activity 3D.2, decide whether you will have students create digital art to use in their games or concept art showing what a polished version of their game would look like. If students are creating digital art, determine what kinds of art they will make (such as characters, objects in the game, or backgrounds).

- Optional: Before Activity 3E.1, if the game development software you're using allows users to post scripts for completed games, download one or more scripts for user-generated games that work, are well-constructed, and, ideally, are similar to the kinds of games that students are planning to make. For example, *The Ghostly Maze* game used as an example in the unit is similar in concept to the Pac-Man arcade game. If students were designing a game like *The Ghostly Maze*, you might download scripts for games that were similar to (or clones of) Pac-Man. See *Media & Resources* for links to scripts for completed games.
- Optional: Before Activity 3E.1, prepare any tutorials or handouts about the game development software that students are using.

Part 4: Presenting the Game

Equipment

- Equipment to play clips of media productions selected by students, such as DVD players, TVs, or computers with speakers (enough equipment for several students to play clips at the same time)
- Computers for teams' demonstrations of game play
- Optional: Projector for displaying students' games as they demonstrate game play

Handouts

- **Assessment Checklist 5: Career Profile Project**
- **Handout 19: Career Profile Presentation**
- **Handout 20: Career Profile Peer Assessment** (four copies for each student)
- **Handout 21: Presenting Your Game**
- **Assessment Checklist 6: Unit Project—Presentation**

Items Students Need to Bring

- Copies of **Handout 11: Career Profile Project** from *Foundations in Media and Digital Design: Animation & Game Design, Unit 1: The Animated World* (this handout is also included in this unit in **Appendix E: The Career Profile Project**)
- Teams' completed video game treatment
- Team's completed copies of **Handout 11: Game Design Document Template**
- Teams' completed game interface wireframes
- Completed game art (either digital art used in the game or concept art)
- Completed game

Advance Preparation

> **Note:** If students completed the Career Profile project while taking *DIMIA Foundations in Media and Digital Design: Audio & Video*, completion of the project is optional in this course.

- If you have invited AME professionals to attend students' game presentations in Activity 4B, confirm the arrangements with them.

Media & Resources

These recommended Web sites have been checked for availability and for advertising and other inappropriate content. However, because Web site policies and content change frequently, we suggest that you preview the sites shortly before using them.

Media & Resources are also available at http://dma.edc.org and at http://dmamediaandresources.pbworks.com, a Wiki that allows users to add and edit content.

General Game Design Resources

Information About Game Design

The following books and Web sites contain in-depth information about game design.

Fullerton, T. (2008). *Game Design Workshop: A playcentric approach to creating innovative games*. Burlington, MA: Elsevier.

Novak, J. (2005). *Game Development Essentials*. Clifton Park, NY: Thomson Delmar Learning.

GameDev.net
www.gamedev.net

Institute of Play
www.instituteofplay.com/

Gamasutra: The Art and Business of Making Games
www.gamasutra.com

Game Development Software

Gamestar Mechanic
http://gamestarmechanic.com/

Kodu
http://fuse.microsoft.com/project/kodu.aspx
http://planetkodu.com/

Scratch
http://scratch.mit.edu/

Game Maker
www.yoyogames.com/gamemaker

Flash
www.adobe.com/products/flash/

Unity

http://unity3d.com/

Unreal

www.unreal.com/

RPG Maker XP

http://tkool.jp/products/rpgxp/eng/

Interviews with Game Developers

Level Designer

Interview with Van, Level Designer at Torus

www.youthcentral.vic.gov.au/Games+%26+Competitions/Get+into+games/Career+profiles/Level+Designer+-+Van/

Interview with John Feil, Level Designer, LucasArts Entertainment

http://archives.igda.org/breakingin/profile_john_feil.htm

Interview with Chris Kay, April 27, 2009, Level Designer at Crytek

www.worldofleveldesign.com/categories/interviews/chris-kay-interview.php

Interview with Dave Ewing, Senior Level Designer at Epic Games

www.unreal.fr/page.php?interview=11

Associate Producer

Interview with Dave Knudsen, Associate Producer at Rainbow Studios

http://pursuethepassion.jobing.com/interviews/2009/02/09/career-interview-video-game-associate-producer/

Interview with Sheloman Byrd, Associate Producer at Nexon American, Inc.

www.truegameheadz.com/blogheadz/dev-box-interview-maplestorys-associate-producer-sheloman-byrd/

Interview with Seonaidh Davenport, Program Manager (Producer) at Microsoft Games

http://archives.igda.org/breakingin/profile_seonaidh_davenport.htm

Interview with Kevin, Producer at Torus

www.youthcentral.vic.gov.au/Games+%26+Competitions/Get+into+games/Career+profiles/Producer+-+Kevin/

Lead Programmer

Interview with Adam, Lead Programmer at IR Gurus

www.youthcentral.vic.gov.au/Games+&+Competitions/Get+into+games/Career+profiles/Lead+programmer+-+Adam/

Interview with Ben Board, Lead Programmer at Dogfish Entertainment

http://archives.igda.org/breakingin/profile_ben_board.htm

Interview with Rafael Baptista, General Manager and Lead Programmer at Helixe Games

http://archives.igda.org/breakingin/profile_rafael_baptista.htm

Interview with Tammy Yap, Programmer at Check Six Studio

http://archives.igda.org/breakingin/profile_tammy_yap.htm

Advance Preparation for the Unit

Games for Students to Play in Class

Console Games

Braid

Final Fantasy series

Katamari Damacy

Kingdom Hearts series

Legend of Zelda series

Little Big Planet

Mario series

Metroid series

Shadow of the Colossus

PC Games

Auditorium

Civilization series

Machinarium

Myst series

Plants vs. Zombies

Portal

Sim series (especially *Sim City*)

Spore

Warcraft series

Mobile Games

Students may have access to games through their mobile phones. Other mobile games are listed below.

Brain Age

Electroplankton

Patapon series

Pokémon series

Scribblenauts

Board Games

Axis and Allies

Battleship

Lost Cities

Mancala

Othello

Scrabble

Settlers of Catan

Uno

Game Tutorials

See *Media & Resources* for Activity 1B.

Part 1: Introduction to Games

Activity 1A: Elements and Features of Games

Links to Online Games

www.ferryhalim.com/orisinal/

www.kongregate.com

www.pogo.com/ (requires sign-up)

www.popcap.com

http://gamestarmechanic.com (once you are logged in, go to "Game Alley")

http://scratch.mit.edu (go to "Projects"—and note that many of the projects are not games)

http://planetkodu.com/category/games

www.yoyogames.com/

Activity 1B: Exploring Game Development Software

Game Tutorials and Introductory Activities

Gamestar Mechanic

http://gamestarmechanic.com
Once you are logged in, go to "Quest."

Kodu

http://fuse.microsoft.com/project/kodu.aspx
The "Getting Started" tab includes videos about Kodu, and the "Classroom Kit" tab includes lesson plans. Students can also complete the Challenges in the Kodu software.

Scratch

http://info.scratch.mit.edu/Video_Tutorials

ScratchEd is a site where teachers upload resources, such as tutorials and articles.

http://scratched.media.mit.edu/

http://learnscratch.org/

Game Maker

www.yoyogames.com/make/tutorials

Part 2: Reverse Design

Activity 2A: Introduction to Reverse Design

Links to Online Video Games

www.ferryhalim.com/orisinal/

www.kongregate.com

www.pogo.com/ (requires sign-up)

www.popcap.com

http://gamestarmechanic.com (once you are logged in, go to "Game Alley")

http://scratch.mit.edu (go to "Projects"—and note that many of the projects are not games)

http://planetkodu.com/category/games

www.yoyogames.com/

Part 3: Video Game Design and Development

Activity 3D: Art Design

Suggestions for finding screenshots to analyze are listed below.

Banjo-Kazooie

http://banjo-kazooie.com/media/screensaver.htm

http://media.xbox360.ign.com/media/015/015334/imgs_1.html

http://banjo-kazooie.com/

Game Daily (video game screenshots)

www.gamedaily.com/game-images/?page=1

Gamespot (Web site about gaming, with many video game reviews that include screenshots—some with onscreen user interfaces)

www.gamespot.com/

Iron Man video game screenshots

www.marvel.com/news/vgstories.1723.Heavy_Metal~colon~_5_Iron_Man_ Video_Game_Screens

Lost Winds: Winter of the Melodias screenshot

www.videogamer.com/wii/lostwinds_winter_of_the_melodias/screenshot-17.html

X-Men: The Official Game screenshots

http://videogames.yahoo.com/thumbgallery?cid=1951257559&tab=thumbgaller y&page=0&eid=-1

Activity 3E: Creating the Game

Links to completed scripts for games made in different game development software programs are listed below.

Gamestar Mechanic

Because the Gamestar Mechanic platform doesn't use scripts or a programming language, there are no sample scripts. However, students can see games developed by other students.

http://gamestarmechanic.com/

Kodu

There are sample games loaded with Kodu. Students can look at the code for these games. (Note that some sample games require the use of an Xbox controller.) Students can also download games from Planet Kodu and look at the code for those games.

http://planetkodu.com/category/games/

Scratch

Once logged in, students can download any of the projects in the "Projects" or "Galleries" sections of the Web site, and look at the code.

http://scratch.mit.edu

Game Maker

In the Game Maker forums, game developers can upload completed games or works in progress.

http://gmc.yoyogames.com/

Standards

This unit was developed to meet the following standards.

Career and Technical Education AME Industry Sector Foundation Standards

2.0 Communications

Students understand the principles of effective oral, written, and multimedia communication in a variety of formats and contexts.

2.1 Reading
Specific applications of Reading Comprehension standards (grades nine and ten):
(2.4) Synthesize the content from several sources or works by a single author dealing with a single issue; paraphrase the ideas and connect them to other sources and related topics to demonstrate comprehension.
(2.5) Extend ideas presented in primary or secondary sources through original analysis, evaluation, and elaboration.

2.2 Writing
Specific applications of Writing Strategies and Applications standards (grades eleven and twelve):
(1.6) Develop presentations by using clear research questions and creative and critical research strategies (e.g., field studies, oral histories, interviews, experiments, electronic sources).
(2.6) Deliver multimedia presentations:
a. Combine text, images, and sound by incorporating information from a wide range of media, including films, newspapers, magazines, CD-ROMs, online information, television, videos, and electronic media-generated images.

2.3 Written and Oral English Language Conventions
Specific applications of English Language Conventions standards (grades eleven and twelve):
(1.1) Demonstrate control of grammar, diction, and paragraph and sentence structure and an understanding of English usage
(1.2) Produce legible work that shows accurate spelling and correct punctuation and capitalization

3.0 Career Planning and Management

Students understand how to make effective decisions, use career information, and manage personal career plans:

3.1 Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers.

3.2 Understand the scope of career opportunities and know the requirements for education, training, and licensure.

4.0 Technology

Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments:

4.2 Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.
4.4 Understand digital applications appropriate to specific media and projects.
4.5 Know the key technological skills appropriate for occupations in the arts industry.
4.7 Understand how technology can reinforce, enhance, or alter products and performances.

5.0 Problem Solving and Critical Thinking

Students understand how to create alternative solutions by using critical and creative thinking skills, such as logical reasoning, analytical thinking, and problem-solving techniques:

5.1 Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
5.3 Use critical thinking skills to make informed decisions and solve problems.
5.4 Use the elements of the particular art form to observe, perceive, and respond.
5.5 Understand the application of research and analysis skills to the creation of content.

7.0 Responsibility and Flexibility

Students know the behaviors associated with the demonstration of responsibility and flexibility in personal, workplace, and community settings:

7.1 Understand the qualities and behaviors that constitute a positive and professional work demeanor.
7.2 Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
7.3 Understand the need to adapt to varied roles and responsibilities.
7.7 Develop a personal commitment to and apply high-quality craftsmanship to a product or presentation and continually refine and perfect it.

9.0 Leadership and Teamwork

Students understand effective leadership styles, key concepts of group dynamics, team and individual decision making, the benefits of workforce diversity, and conflict resolution:

9.3 Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.
9.5 Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others.
9.7 Cultivate consensus, continuous improvement, respect for the opinions of others, cooperation, adaptability, and conflict resolution.

10.0 Technical Knowledge and Skills

Students understand the essential knowledge and skills common to all pathways in the Arts, Media, and Entertainment sector:

10.6 Know the appropriate skills and vocabulary of the art form.
10.7 Understand and analyze the elements of the art form.
10.10 Use technical applications in the creative process, where appropriate.

11.0 Demonstration and Application

Students demonstrate and apply the concepts contained in the foundation and pathway standards.

Career and Technical Education AME Industry Sector Media and Design Arts Pathway Content Standards / VPA Visual Arts Content Standards

- Identify and use the principles of design to discuss, analyze, and write about visual aspects in the environment and in works of art, including their own. [AME A1.1 (1.1), VPA 1.1]
- Research and analyze the work of an artist and write about the artist's distinctive style and its contribution to the meaning of the work. [AME A1.1(1.3), VPA 1.3]
- Analyze and describe how the composition of a work of art is affected by the use of a particular principle of design. [AME A1.1(1.4), VPA 1.4]
- Solve a visual arts problem that involves the effective use of the elements of art and the principles of design. [AME A1.2(2.1), VPA 2.1]
- Prepare a portfolio of original two- and three-dimensional works of art that reflects refined craftsmanship and technical skills. [AME A1.2(2.2), VPA 2.2}
- Develop and refine skill in the manipulation of digital imagery (either still or video). [AME A1.2(2.3), VPA 2.3]
- Articulate the process and rationale for refining and reworking one of their own works of art. [AME A1.4(4.4), VPA 4.4]
- Employ the conventions of art criticism in writing and speaking about works of art. [AME A1.4(4.5), VPA 4.5]

A2.0 Technical Requirements

Students understand the key technical and technological requirements applicable to various segments of the Media and Design Arts Pathway.

A2.1 Analyze the way in which technical design (e.g., color theory, lighting, graphics, typography, posters, sound, costumes, makeup) contributes to a performance or presentation.

A2.2 Know the component steps and skills required to design, edit, and produce a production for audio, video, electronic, or printed presentation.

A2.3 Use technology to create a variety of audio, visual, written, and electronic products and presentations.

A2.5 Know the writing processes, formats, and conventions used for various media.

A2.8 Use models, simulations, and other tests to determine optimal design solutions from a variety of options.

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