

Game Development Essentials
Game QA & Testing



Luis Levy
Jeannie Novak

GAME DEVELOPMENT ESSENTIALS

GAME QA & TESTING

Luis Levy
Jeannie Novak

CENGAGE **brain**.com



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Game Development Essentials:

Game QA & Testing

Luis Levy & Jeannie Novak

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Introduction

Game QA & Testing: the new professionals

I want to be a game tester when I grow up! Most likely, this sentence has never been uttered. Game testing is just not one of *those* professions—at least, not yet. Gamers usually want to become game designers, producers, artists, or programmers. However, consider this little known fact: Game testing is one of the best ways to break in the game industry!

When game projects staff up in May, hundreds of testers flood publishers and developers alike with the unbridled energy of hardcore gamers. However, a majority of these testers had no training whatsoever before being hired to do what is a fairly technical job. They're blamed for lacking knowledge to which they have never been exposed. When developers complain about testers, their major gripes center around a lack of professionalism—skills, appearance, attitude, education, or initiative. In this book, we will attempt to correct this. Written by industry insiders, *Game QA & Testing* is intended as an in-depth introduction to the world of game testing—from basic game development concepts to advanced testing techniques. We want to take testing to the next level—helping testers to become elite specialists in particular fields (e.g., art, audio, level design, networking, performance, compatibility, physics, artificial intelligence). This is no easy task, and no other industry moves quite as fast as the game industry. Still, *Game QA & Testing* contains enough information to swiftly change the game for would-be testers.

In this book, you will learn: the role of game testers in quality assurance (QA) departments; the difference between QA and production testing; basic and advanced testing techniques; how to avoid being put “on call”; how to get promoted; and the future of testing. As one of the few books of its kind on the market, *Game QA & Testing* is a much needed, invaluable resource for students and game developers alike.

Today, testing is seen as a necessary evil—and testers are sometimes portrayed as hardcore gamers looking for a quick buck. This will all change as testers become highly sought-after professionals with unique skills. It's all a matter of time and effort—just like mastering a game!

Luis Levy
Santa Monica, CA

Jeannie Novak
Santa Monica, CA

About the *Game Development Essentials* Series

The *Game Development Essentials* series was created to fulfill a need: to provide students and creative professionals alike with a complete education in all aspects of the game industry. As more creative professionals migrate to the game industry, and as more game degree and certificate programs are launched, the books in this series will become even more essential to game education and career development.

Not limited to the education market, this series is also appropriate for the trade market and for those who have a general interest in the game industry. Books in the series contain several unique features. All are in full-color and contain hundreds of images—including original illustrations, diagrams, game screenshots, and photos of industry professionals. They also contain a great deal of profiles, tips, and case studies from professionals in the industry who are actively developing games. Starting with an overview of all aspects of the industry—*Game Development Essentials: An Introduction*—this series focuses on topics as varied as story & character development, interface design, artificial intelligence, gameplay mechanics, level design, online game development, simulation development, and audio.

Jeannie Novak
Lead Author & Series Editor

About *Game Development Essentials: Game QA & Testing*

This book provides an overview of game quality assurance (QA) and testing—complete with historical background, techniques, strategies, and future predictions.

This book contains the following unique features:

- Key chapter questions that are clearly stated at the beginning of each chapter
- Coverage that surveys the topics of game QA and testing concepts, process, and techniques
- Thought-provoking review and study exercises at the end of each chapter suitable for students and professionals alike that help promote critical thinking and problem-solving skills
- Case studies, quotations from leading professionals, and profiles of game QA and testing professionals that feature concise tips and techniques to help readers focus on issues specific to game QA and testing
- An abundance of full-color images throughout that help illustrate the concepts and practical applications discussed in the book

There are several general themes that are emphasized throughout this book, including:

- Defining the role of the game tester and how it fits into the game development team
- Exploring technology considerations associated with game testing
- Illustrating techniques and disciplines associated with game testing
- Investigating game testing issues associated with bug reports, documentation, and tracking
- Evaluating existing games and how they've been improved through game testing

Who Should Read This Book?

This book is not limited to the education market. If you found this book on a shelf at the bookstore and picked it up out of curiosity, this book is for you too! The audience for this book includes students, industry professionals, and the general interest consumer market. The style is informal and accessible with a concentration on theory and practice—geared toward both students and professionals.

Students that might benefit from this book include:

- College students in game development, interactive design, entertainment studies, communication, and emerging technologies programs
- Art, design, programming, and production students who are taking game development courses
- Professional students in college-level programs who are taking game development courses
- Game development students at universities who are taking game testing, production, and prototyping courses

The audience of industry professionals for this book include:

- Managers, directors, and producers from other industries who are interested in becoming game development professionals
- Game art, design, programming, and production professionals who are interested in becoming game test leads and QA managers
- Professionals such as producers, designers, and programmers in other arts and entertainment media—including film, television, and music—who are interested in transferring their skills to the game development industry

How Is This Book Organized?

This book consists of three parts—focusing on the evolution of the tester within a career in game development.

Part I Game Start—Focuses on providing a historical and conceptual context to game QA and testing. Chapters in this section include:

- **Chapter 1 QA & Testing Through the Ages: a historical background**—discusses functions, standards, platforms, advantages, and the history of game QA and testing
- **Chapter 2 The Mysterious World of Testing: working conditions & demographics**—explores misconceptions, roles, environment, and tester characteristics
- **Chapter 3 The Many Faces of Testing: the game life cycle**—definition and varieties of bugs; how game testing and QA are incorporated into a game’s life cycle; and the distinction between different testing disciplines
- **Chapter 4 Planning Your Strategy: bug categories, tools & documentation**—explores bug categories, tracking tools, management roles, and documentation associated with game QA and testing

Part II Level Up—Focuses on the details associated with both basic and advanced testing. Chapters in this section include:

- **Chapter 5 Start Your Engines! bare bones bug hunting**—discusses bug spotting tips, reports, verification, and game genres
- **Chapter 6 Race to the Finish Line: elite bug hunting**—focuses on advanced bug hunting skills, normal vs. tough bugs, testing techniques, task forces, and achieving greatness as a tester

Part III End Game—Focuses on how to get a testing job, work up the testing ladder, and future predictions. Chapters include:

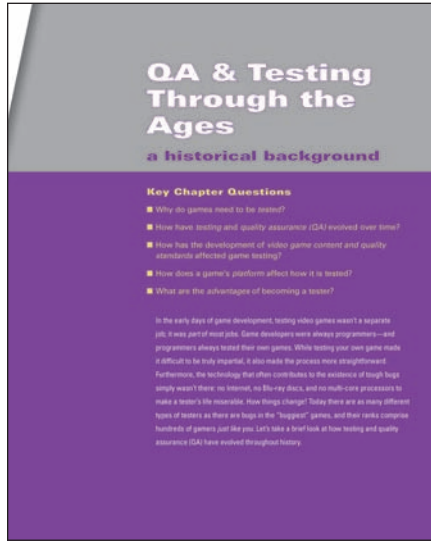
- **Chapter 7 Ready, Set, Go!: entering the world of game testing**—explores the job search and application process, how to get noticed by prospective employers, and educational opportunities—along with resume, cover letter, and interviewing tips
- **Chapter 8 Surviving & Escaping the Dungeon: transcending testing**—explores getting promoted, moving laterally, avoiding common mistakes, and standing out as a tester
- **Chapter 9 Testing Future Waters: what’s next & how to get there**—highlights trends, “beneficial” bugs, lifecycle overview, and future predictions related to game QA and testing

The book also contains a **Resources** section—which includes a list of game development news sources, guides, directories, conferences, articles, and books related to topics discussed in this text.

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How to Use This Text

The sections that follow describe text elements found throughout the book and how they are intended to be used.



key chapter questions

Key chapter questions are learning objectives in the form of overview questions that start off each chapter. Readers should be able to answer the questions upon understanding the chapter material.

notes

Notes contain thought-provoking ideas provided by the authors that are intended to help the readers think critically about the book's topics.



sidebars

Sidebars offer in-depth information from the authors on specific topics—accompanied by associated images.

case studies

Case studies contain anecdotes from industry professionals (accompanied by game screenshots) on their experiences developing specific game titles.

34 **Blizzard Energy: Testing Warcraft III**



When I look at Blizzard, it was a lot of fun. But come on, how could it not be? We were working Warcraft III—the follow-up to one of the greatest games of all time. The office was diverse and respectful, which helps. But more important was the sheer energy present at that place. Here were some of the greatest creative minds in the game industry, but it was in high school, only your intelligence and skills can save you from a horrible fate. Merely showing up is not enough. You need to lead. You need to find and verify the most severe bugs. And you need to do that every... day. We're going to share a real nightmarish scenario with you. Fortunately, conditions have improved at most companies since the days of the Dragon and the Princess. If you find yourself in a similar situation, you may want to look elsewhere!

—Todd M. Fay (Senior, Development)

The Ecosystem of Testing

Only the strong survive. Just like it was in high school, only your intelligence and skills can save you from a horrible fate. Merely showing up is not enough. You need to lead. You need to find and verify the most severe bugs. And you need to do that every... day. We're going to share a real nightmarish scenario with you. Fortunately, conditions have improved at most companies since the days of the Dragon and the Princess. If you find yourself in a similar situation, you may want to look elsewhere!

Welcome to the Dungeon . . .

Most of the time (but not always, as you'll see from some of the industry tips in this chapter), testers are put in the least comfortable, coldest, most unloved offices. This is because testers are seen as "disposable" and easy to hire. There's no such thing as getting to "retire." At a large publisher, the "openers" (upper floors were check full of executives, producers, and the marketing team—in contrast to what became known on the QA team as "the Dungeon"). As you may have guessed, the Dungeon was underground, no windows, no sun, no fun—just a bunch of cubicles surrounded by an outer ring of cold, sterile rooms. The offices destined for the team were also very crowded. Casual testers were crammed into small spaces so that their desks were the size of their televisions—usually only 17" monitors (larger 20" people in a room full of wires, consoles, old televisions, and action figures. That's what a testing room can look like. Oh, and cell phones didn't work in the Dungeon. Just a little detail of course, since members of the QA team apparently didn't have lives! All the team could do was laugh about it—and rush up to ground level on breaks in case a conversation with a spouse or significant other was needed.

66 **Playtesting**

The "fun testing" seen on television ads is playtesting—first mentioned in Chapter 2. Contrary to productivity software such as Microsoft Office, games need to be fun to play. To simply "work as intended," is not enough, game designers must tap into what is known as "the fun factor." In a Gamestar article entitled "Secrets of the Super Level Design," The Levelhead from Retail Entertainment, explains:

"There are no defined rules for fun, and the only way to ensure the Fun Factor is to playtest. The core part about adding the Fun Factor is that most all of us have the same concept of fun, that is, if you the game developer think it's fun, then the game audience is likely to think so, too. The Fun Factor is not treatment or splashy, either. It should survive countless trials and tests and still be entertaining in the end. This is the only way to ensure that a game is fun—to play test it over and over."

Making a game fun to play takes a bit more than good intentions and magic dust. It takes guts, determination, and exemplary teamwork. Likewise, playtesting is not something you do to pass the time and have a couple of laughs. The best playtesters can divide themselves into two personas: the player, and the professional.

- 1) **Player:** Always ready for the next thrill.
- 2) **Professional:** Always watchful of gameplay mechanics (i.e., navigation, scoring, targeting, interaction, behavior, physics, artificial intelligence, goals)

A game can only be great when playtesting is taken very seriously by everyone in the team.

Nintendo's "Fun Factor"

Lots of developers such as Blizzard and LucasArts demonstrate excellent quality assurance over the years, but Nintendo in particular seems to have taken control of the fun in the very beginning. Nintendo's games have always exhibited a fun gameplay balance, a "fun factor," that often proves elusive in the industry. This emphasis on balancing and polishing gameplay, by definition, leads to top-notch quality control. If you're focusing as best as possible on making the game fun—and testing and repeating it—your focus is bound to uncover and address any significant bugs. Along the way, you'll gain enough control of the development process so that new bugs aren't introduced at a point where they may not be found again.

—Justin London (Computer & Board Designer, Board for Games International)

quotes

Quotes contain short, insightful thoughts from industry professionals, observers, players, and students.

tips

Tips provide advice and inspiration from industry professionals and educators, as well as practical techniques and tips of the trade.

108 **Bug Spotting**

As we've mentioned many times before, testing a game is very different from playing it. If you really want to spot bugs, you need to do so willingly. Merely playing a game will grant you a number of "dead" over time—but you will merely avoid upon them. Pure accident (not technique) will dictate your performance. If you're a game tester, you'll want to discover bugs at will. You'll need to have all of your testing skills on tap.

Game Games & Bugs

As discussed in Chapter 4, bugs are software flaws that make themselves noticeable to players. If a bug exists, but can never be found, it's essentially the same as not being there. Therefore, you will only be able to spot bugs that manifest themselves as visual, audio, or gameplay flaws. If you look at different games, it will become clear to you that bugs are game-specific. Furthermore, the techniques you may use to spot a bug in a first-person shooter (FPS) may be vastly different than the techniques in a simulation game. What you need to verify absolutely everything to do a good job as a tester, some games have "weak spots" that should always receive a healthy dose of attention.

2D Platformers

One of the oldest game genres, 2D platformers started life in late 1970s arcade and took a big leap forward with Super Mario Bros. When testing platformers, your main focus will be on gameplay. Since these games are fairly single levels with its landmark time-shifting, fluid is still categorized as a platformer, visual and audio bugs will be clear from the onset—while any lack of precision in player movement might be more difficult to pinpoint. You will also want to ensure that enemy behavior makes sense; it's easy for artificial intelligence (AI) bugs to slip by, making enemies behave a little "sloopy."



—David with its landmark role shifting, Mario's still largely and preferred as a 2D platformer.



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Your main purpose as a tester is to:

- find bugs
- replicate them
- report them


Secondary objectives are to:

- verify that the bugs have been fixed
- make sure the game is fun

If you keep these directives in mind, you'll become an extraordinary tester. Now it's time to take the first step into the "inner circle" of testing. Let's start by taking a closer look at bug severity levels.

Edward Rotberg on the Tester Who Saved the Day

Ed Rotberg has been in the game business since 1970, working as a producer, designer, programmer, and executive manager at various times in his career. He was one of the founders of Vidya, which was eventually acquired by Buell Midway. His career has also included a two-year stint at Apple Computer. He has worked at Atari (Atari Baseball, BattleZone, Star Wars, Star Trek, S.T.U.N. Heroes, Shogun, Zaxxon, Guardians of the Reef, Early Midway Game Pit, 300 (Charon Precision), NASCAR Racing (MCA), Silicon Entertainment (NASDAQ Silicon Motor Speedway), THQ (MX Superfly, WWF CrushFest), and Midway Staff Entertainment (High Heat Baseball 2002, Nickel Pro Soccer Golf, Blazing Angels, Squares of WWF).



Edward Rotberg
Chief Technology
Officer, Midway
Entertainment

While I was at 300, we were doing an "obitainment" title on a rush schedule. There was a lot of video content to the game, which was targeted toward grade school children. In one of the video sections that was prepping a TV talk show, the audience (not the player) was urged to call an 800 phone number that spelled out a cute and appropriate phrase. Fortunately, on his own initiative, one of our testers decided to call this number. It turned out to be an adult hot line, and we had just enough time to change that video content before the game shipped.

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profiles

Profiles provide bios, photos, and in-depth commentary from industry professionals and educators.

chapter review

Chapter review exercises at the end of each chapter allow readers to apply what they've learned. Annotations and guidelines are included in the instructor resources, available separately (see next page).

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CHAPTER REVIEW

1. Imagine that you are a game tester working in the 1980s. Knowing the limitations associated with this era, describe the type of game you would most likely be working on—and discuss how you would test it to the best of your ability.
2. Play 3 games—one from the 1980s, one from the 1990s, and one released after 2004. Make a list of any obvious bugs (glitches or mistakes) in the text, visuals, audio and general gameplay. Now compare the lists you've made for all 3 games. Which one is the longest? What types of bugs are associated with each game?
3. Play 3 games currently on the market—one on a PC, one on a console system, and one on a handheld system. Make a list of any obvious bugs in each game. Now compare your lists. Do you notice any similarities and differences?

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About the Companion DVD

The companion DVD contains the following media:

- Testing software: Bugzilla, DevTrack (video and link to DevTrack Web version), and TestTrack Pro (PC and Mac trial versions)
- Game engines: Torque (Windows and Mac versions 1.5.1) and Game Maker (version 7)
- Modeling and animation software: Autodesk 3ds Max (version 9) and Autodesk Maya (version 8.5 PLE)
- Game design, technical, and testing articles and documentation: Obsidian Entertainment (sample test plan), iBeta Quality Assurance (sample checklist and test plan), Gas Powered Games (Chris Taylor GDD template), Torn Space (Michael Black *Sub Hunter* GDD), NCsoft (*City of Heroes / City of Villains / Dungeon Runners / Tabula Rasa: Caves of Donn* developer diaries, *Guild Wars: Eye of the North* dungeons & quests), CCP Games (*EVE Online*), Dragon's Eye Productions (*Furcadia*), Harvey Smith/Witchboy's Cauldron (game design articles), and Barrie Ellis/One-Switch Games (game design articles)
- Game demos/trial versions: Blizzard (*Diablo II*), Firaxis (*Civilization IV, Sid Meier's Railroads!*), Stardock (*Galactic Civilizations II: Gold Edition*), THQ (*Company of Heroes*), Enemy Technology (*I of the Enemy: Ril'Cerat*), Star Mountain Studios (*Bergman, Weird Helmet, Frozen, Findolla*), GarageGames (*Marble Blast: Gold, Think Tanks, Zap!*), Max Gaming Technologies (*Dark Horizons: Lore Invasion*), Chronic Logic (*Gish*), Large Animal Games (*Rocket Bowl Plus*), 21-6 Productions (*Tube Twist, Orbz*), CDV (*City Life, Glory of the Roman Empire, War Front: Turning Point*), Last Day of Work (*Virtual Villagers, Fish Tycoon*), Hanako Games (*Cute Knight Deluxe*), Microsoft (*Zoo Tycoon 2: Marine Mania*), U.S. Army (*America's Army*), Cyan Worlds, Inc. (*Myst Online*), CCP Games (*EVE Online*), and Wizards of the Coast (*Magic: The Gathering Online*)

About the Instructor Resources

The instructor resources (available separately on DVD) was developed to assist instructors in planning and implementing their instructional programs. It includes sample syllabi, test questions, assignments, projects, PowerPoint files, and other valuable instructional resources.

Order Number: 1-4354-3946-5

About the Authors

Growing up in Sao Paulo, Brazil, Luis Levy was an extremely bright child but had trouble with his fine motor skills. His mother, a progressive psychologist, saw playing video games as the perfect remedy. She knew from early studies that games could



Photo credit: Jeannie Novak

help him fine-tune his movements in a fun and effective way—and that's precisely what she did. On Luis' ninth birthday, he received a Sega Master System as a gift from his parents. The console's pioneering 3D graphics with special LCD glasses took Luis' imagination and dexterity to a whole new level. Games such as *Phantasy Star* and *Space Harrier 3D* also taught him his first English words. Luis later created batch programs in DOS for an old PC XT and even played *Prince of Persia* on the computer's rusty green phosphor monitor. He also became a major film buff and a member of a very exclusive film club at age 16. By that time, he had

become the main "movie critic" for friends and family and also an expert in both hardware and software. Luis wrote intricate short stories and shot award-winning documentaries (including a daring trip to Brasilia on a bus filled with homeless children and adults) at Brazil's renowned private film school, FAAP—where he received a B.A. in Film and Television. After working as a writer in both advertising agencies and Internet/new media corporations, Luis moved to the U.S. to pursue his true passion: video games. Months after his arrival, he became QA Tester at Activision—where he tested and troubleshot AAA titles such as *Quake 4* and *Call of Duty 2* in PC and current and next-gen consoles. Luis was also Production Tester on *Call of Duty 3* at Treyarch, where he belonged to the multiplayer team. In addition to *Game QA & Testing*, Luis is co-author of *Play the Game: The Parent's Guide to Video Games*. He is currently Assistant Account Executive at The Bohle Company—a public relations firm in Los Angeles specializing in video games and technology that has provided services to Microsoft, 3DO, Activision, Sega, Gravity Interactive, Emergent Game Technologies, and other high-profile clients.

Jeannie Novak is the founder of Indiespace—one of the first companies to promote and distribute interactive entertainment online—where she consults with creative professionals in the music, film, and television industries to help them migrate to the game industry. In addition to being lead author and series editor of the *Game Development Essentials* series, Jeannie is the co-author of *Play the Game: The Parent's Guide to Video Games* and three pioneering books on the interactive entertainment industry—including *Creating Internet Entertainment*. Jeannie is the Online Program Director for the Game Art & Design and Media Arts & Animation programs at the Art Institute of Pittsburgh – Online Division, where she is also Producer & Lead Designer on a educational business simulation game that is being built within the *Second Life* environment. She has also been a game instructor and curriculum development expert at UCLA Extension, Art Center College of Design, Academy of Entertainment and Technology at Santa Monica College, DeVry University, Westwood College, and ITT Technical Institute—and she has consulted for the UC Berkeley Center for New Media. Jeannie has developed or participated in game workshops and panels in association with the British Academy of Television Arts & Sciences (BAFTA), Macworld, Digital Hollywood, and iHollywood Forum. She is a member of the International Game Developers Association (IGDA) and has served on selection committees for the Academy of Interactive Arts & Sciences (AIAS) DICE Awards. Jeannie was chosen as one of the 100 most influential people in high-technology by *MicroTimes* magazine—and she has been profiled by CNN, *Billboard Magazine*, Sundance Channel, *Daily Variety*, and the *Los Angeles Times*. She received an M.A. in Communication Management from the University of Southern California (USC), where she focused on using massively multiplayer online games (MMOGs) as online distance learning applications. She received a B.A. in Mass Communication from the University of California, Los Angeles (UCLA)—graduating summa cum laude and Phi Beta Kappa. When she isn't writing and teaching, Jeannie spends most of her time recording, performing, and composing music. More information can be found at www.jeannie.com and www.indiespace.com.



Photo credit: Luis Levy

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 Josiah Pisciotta (Chronic Logic) Wade Tinney & Andrea Meyer (Large Animal Games)
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 LinkedIn Wgungfu (Wikipedia Commons)
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Questions & Feedback

We welcome your questions and feedback. If you have suggestions that you think others would benefit from, please let us know and we will try to include them in the next edition.

To send us your questions and/or feedback, you can contact the publisher at:

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DEDICATION

To Jeannie, who has successfully debugged me.

—Luis

To Luis, the hunter who skillfully tracked me down.

—Jeannie

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Resources

There's a wealth of information on game development and related topics discussed in this book. Here is just a sample list of books, news sites, organizations, and events you should definitely explore!

Communities & Directories

APM Music www.apmmusic.com
 Apple Developer Connection developer.apple.com
 ArtBarf.com www.artbarf.com
 Betawatcher.com www.betawatcher.com
 Beyond3D www.beyond3d.com
 CG Society www.cgtalk.com
 CG Textures www.cgtextures.com
 Destructoid www.destructoid.com
 DevMaster.net www.devmaster.net
 DevShed Forum forums.devshed.com/game-development-141
 EntertainmentCareers.net www.entertainmentcareers.net
 Gamasutra www.gamasutra.com
 Game Audio Forum www.gameaudioforum.com
 Game Audio Pro Tech Group groups.yahoo.com/group/gameaudiopro
 GameDev.net www.gamedev.net
 Game Development Search Engine www.gdse.com
 GameFAQs www.gamefaqs.com
 Game Music.com www.gamemusic.com
 Game Music Revolution (GMR) www.gmronline.com
 Games Tester www.gamestester.com
 GarageGames www.garagegames.com
 Giant Bomb www.giantbomb.com
 iDevGames Forum www.idevgames.com/forum
 Indiegamer Forum forums.indiegamer.com
 International Dialects of English Archive (IDEA) web.ku.edu/idea/
 Machinima.com www.machinima.com
 Mayang's Free Texture Library www.mayang.com/textures
 MobyGames www.mobygames.com
 Northern Sounds www.northernsounds.com
 Overclocked Remix www.overclocked.org
 Professional Sound Designers Forum psd.freeforums.org
 PS3 www.ps3.net
 Sound Design Forum groups.yahoo.com/group/sound_design

3D Buzz www.3dbuzz.com
3D Total www.3dtotal.com
VGMix www.vgmix.com
Video Game Music Database (VGMdb) www.vgmdb.net
Voicebank.net www.voicebank.net
Wii-Play www.wii-play.com
Xbox.com www.xbox.com
XBOX 360 Homebrew www.xbox360homebrew.com

News, Reviews & Research

Blues News www.bluesnews.com
Computer & Video Games www.computerandvideogames.com
Computer Games Magazine www.cgonline.com
Develop Magazine www.developmag.com
Digital Playroom www.dplay.com
Edge Online www.edge-online.com
Eurogamer www.eurogamer.net
Game Career Guide www.gamecareerguide.com
GameDaily www.gamedaily.com
Game Developer Magazine www.gdmag.com
Gamers Hell www.gamershell.com
Game Industry News www.gameindustry.com
Game-Machines.com www.game-machines.com
GamePolitics www.gamepolitics.com
GameRankings www.gamerankings.com
GamesIndustry.biz www.gamesindustry.biz
GameSlice Weekly www.gameslice.com
GameSpot www.gamespot.com
GameSpy www.gamespy.com
Games Radar (PC Gamer) www.gamesradar.com/pc
Guide to Sound Effects www.epicsound.com/sfx/
Internet Gaming Network (IGN) www.ign.com
Joystiq www.joystiq.com
Kotaku www.kotaku.com
Mayang's Free Texture Library www.mayang.com/textures
MCV www.mcvuk.com
Metacritic www.metacritic.com
Microsoft/Monster Career Center office.microsoft.com/en-us/help/FX103504051033.aspx

MMOGChart.com www.mmogchart.com
Music4Games.net www.music4games.net
1UP www.1up.com
Penny Arcade www.penny-arcade.com
Planet Unreal planetunreal.gamespy.com
PolyCount www.polycount.com
Recording History: The History of Recording Technology www.recording-history.org
Resumé Samples www.freeresumesamples.org
Showfax www.showfax.com
Slashdot games.slashdot.org
Star Tech Journal www.startechjournal.com
Tongue Twisters www.geocities.com/Athens/8136/tonguetwisters.html
UnderGroundOnline (UGO) www.ugo.com
Unreal Technology www.unrealtechnology.com
Unreal Wiki wiki.beyondunreal.com
Voiceover Demos www.compostproductions.com/demos.html
Xbox Developer Programs www.xbox.com/en-US/dev/contentproviders.htm
Wired Game | Life blog.wired.com/games
WorkingGames www.workinggames.co.uk

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Organizations

Academy of Interactive Arts & Sciences (AIAS) www.interactive.org
 Academy of Machinima Arts & Sciences www.machinima.org
 Association of Computing Machinery (ACM) www.acm.org
 Audio Engineering Society (AES) www.aes.org
 Business Software Alliance (BSA) www.bsa.org
 Digital Games Research Association (DiGRA) www.digra.org
 Entertainment Software Association (ESA) www.theesa.com
 Entertainment Software Ratings Board (ESRB) www.esrb.org
 Game Audio Network Guild (GANG) www.audiogang.org
 Game Audio Technical Committee www.aes.org/technical/ag
 Interactive Audio Special Interest Group (IASIG) www.iasig.org
 International Computer Games Association (ICGA) www.cs.unimaas.nl/icga
 International Game Developers Association (IGDA) www.igda.org

Events

Consumer Electronics Show (CES) January Las Vegas, NV www.cesweb.org	Tokyo Game Show (TGS) Fall Japan tgs.cesa.or.jp/english/
Game Developers Conference (GDC) March San Francisco, CA www.gdconf.com	Austin Game Developers Conference September Austin, TX www.gameconference.com
D.I.C.E. Summit (AIAS) March Las Vegas, NV www.dicesummit.org	IndieGamesCon (IGC) October Eugene, OR www.indiegamescon.com
SIGGRAPH (ACM) Summer (location varies) www.siggraph.org	Project Bar-B-Q October Lake Buchanan, TX www.projectbarbq.com
E3 Expo June Los Angeles, CA www.e3expo.com	

Colleges & Universities

Here is a list of schools that have strong game degree or certificate programs:

Academy of Art University www.academyart.edu
 American Intercontinental University www.aiuniv.edu
 Arizona State University www.asu.edu
 Art Center College of Design www.artcenter.edu
 Art Institute of Pittsburgh - Online Division www.aionline.edu
 The Art Institutes www.artinstitutes.edu
 Carnegie Mellon University/Entertainment Technology Center www.cmu.edu
 DeVry University www.devry.edu
 DigiPen Institute of Technology www.digipen.edu
 Ex'pression College for Digital Arts www.expression.edu
 Full Sail Real World Education www.fullsail.edu
 Guildhall at SMU guildhall.smu.edu
 Indiana University - MIME Program www.mime.indiana.edu
 International Academy of Design & Technology www.iadtschools.com
 Iowa State University www.iastate.edu
 ITT Technical Institute www.itt-tech.edu
 Massachusetts Institute of Technology (MIT) media.mit.edu
 Rasmussen College www.rasmussen.edu
 Rensselaer Polytechnic Institute www.rpi.edu
 Ringling College of Art & Design www.ringling.edu
 SAE Institute www.sae.edu
 Santa Monica College Academy of Entertainment & Technology academy.smc.edu
 Savannah College of Art & Design www.scad.edu
 Tomball College www.tomballcollege.com
 University of California, Los Angeles (UCLA) Extension www.uclaextension.edu
 University of Central Florida - Florida Interactive Entertainment Academy fiea.ucf.edu
 University of Southern California (USC) - Information Technology Program itp.usc.edu
 University of Southern California (USC) School of Cinematic Arts interactive.usc.edu
 Vancouver Film School www.vfs.com
 Westwood College www.westwood.edu

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