

ENVIRONMENTAL SCAN

Emerging Trends in Game Development

Serious Games, Simulations, Casual and Mobile Games, and Virtual Worlds

For California Community Colleges

September 2008



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CENTERS OF EXCELLENCE
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In collaboration with:

*Multimedia &
Entertainment
Initiative*



Advancing the Business of Creativity



**ECONOMIC &
WORKFORCE
DEVELOPMENT**
through the
CALIFORNIA
COMMUNITY
COLLEGES

Emerging Trends in Game Development: Serious Games, Simulations, Casual and Mobile Games, and Virtual Worlds

September 2008

The workforce needs of employers in the emerging non-entertainment game industry in California were the target of this primary research study. The findings support the creation, adaptation or expansion of game development programs at California Community Colleges to meet the increasing industry demand and provide employment opportunities for students.

For More Information

This study was a joint project between the Multimedia & Entertainment Initiative and the four Centers of Excellence listed below:



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Contents

Executive Summary.....	3
Introduction	4
Industry Overview	5
Industry Size	12
Game Applications Being Developed and Considered for Future Projects	13
Occupational Overview	14
Occupational Skills and Training Requirements	15
Employer Needs and Challenges	17
College Response and Issues.....	20
Community Support and Resources	23
Conclusions and Recommendations.....	25
References.....	27
Appendix A: How to Use this Report	28
Appendix B: Employer Locations in California.....	29
Appendix C: Employer Database and Data Limitations.....	31
Appendix D: Occupation Definitions.....	32
Appendix E: Career Path Information	33
Appendix F: Industry Salary Survey	34
Appendix G: Multimedia & Entertainment Initiative	35
Appendix H: Contact List of College Survey Respondents	36
Appendix I: Summary of College Survey Responses.....	37
Appendix K: Survey Methodology.....	39
Appendix L: Community College Survey Questionnaire	40

Based on a 2008 survey of game firms in five emerging sectors in California, the industry currently employs approximately 9,600 workers. These game firms are projected to increase employment by as much as 19% or 1,800 jobs in the state during the next 12 months.

— Source: BW Research Partnership

Executive Summary

The Multimedia and Entertainment Initiative (MEI) in collaboration with the Centers of Excellence (COE) studied the workforce needs of emerging non-entertainment sectors within the larger game industry for California Community Colleges. These sectors include serious games and simulations, casual and mobile games, and virtual worlds. Industries that support the development of games were also examined. Regional distribution of firms is largely concentrated in Los Angeles and Orange Counties, San Francisco Bay area and Silicon Valley.

The marketplace for emerging sectors of the game industry is growing and changing rapidly. Games and simulations are being developed for serious purposes—training, education and persuasion—with defense, healthcare and education as the current major investors. The fastest growing application of serious games is corporate training as it moves into virtual world environments. The expansion of and access to wireless broadband has fueled the expansion of mobile and casual games and is pulling in a different demographic gamer. And virtual worlds, such as Second Life, are some of the most active sites on the Web.

The major research objectives of this study were to:

1. Identify emerging sector game firms and other businesses that support the game industry, their products and applications
2. Determine if these businesses and industries hire employees with similar skill sets and shared occupational titles
3. Project employment growth for the identified occupations
4. Validate employer challenges to recruit, hire and retain their workforce
5. Identify existing, as well as planned college courses and programs to inform program expansion and/or adaptation.

Over 100 firms participated in a survey to validate the demand for occupations and workforce challenges of employers. Qualitative interviews were conducted to further inform this report. From this research, eight occupations were examined that are most relevant to community colleges.

Firms in the emerging game sectors, and those industries which are connected to game development, are projected to increase employment by as much as 19%, or 1,800 jobs in the state within the next 12 months. The research shows a gap between the demand for game occupations and the available supply of qualified candidates in all eight occupations studied. Employers expressed a great interest in education programs that can be developed by community colleges, especially for full-time internships. A substantial number said they are willing to serve as an advisor to community colleges in developing programs and curriculum.

Community colleges around the state are already developing and offering game development instructional programs, largely for the entertainment game sector. An overview of some of these programs, along with future course development can be found in this report.

Due to their existing program infrastructure and with the services and support provided by the MEI, community colleges may be well-positioned to build a pipeline of skilled workers, create and expand industry partnerships and provide additional professional development for college faculty in these new technologies.

The findings from this Environmental Scan support the creation, adaptation and expansion of game development education programs at California Community Colleges to meet the increasing demand of employers, and provide additional employment opportunities for students.

Introduction

The California Community College System has charged the Centers of Excellence, one of the ten initiatives of the Economic and Workforce Development (EWD) Network, with identifying industries and occupations that have unmet employee development needs and partnering potential for the colleges' programs.

Previous Study

The entertainment sector of the game industry was studied in 2005-06 in collaboration with the Multimedia and Entertainment Initiative (MEI) and the Entertainment Economy Institute (EEI) that targeted employers in Los Angeles/Orange Counties and San Francisco Bay.¹

This study provided the rationale and opportunities for colleges to create or expand game development courses and programs with the following key findings:

- Strong employment growth rate in the occupations studied.
- Shortage of qualified applicants for entry-level and mid-level jobs.
- High level of employer interest to partner with colleges to develop programs.
- Validated occupational skills information.

Current Study

In 2007 the MEI again partnered with the COEs to examine workforce needs of California employers within five sectors in the **emerging non-entertainment** game industry. These include serious games, simulations, casual and mobile games, and virtual worlds. Industries that support the development of games were also examined.

¹ Computer and Video Game Environmental Scan Report available for download at www.coeccc.net.

Primary research was conducted with 415 firms identified in California from mid-May through early July, 2008, resulting in 105 responses to a survey. The study focused on gathering the following information using both quantitative and qualitative data:

- Identify game firms in the emerging sectors, their geographical concentration, and size.
- Describe emerging game firms, their products and applications; and identify other businesses that support the game industry.
- Determine if emerging sector businesses and support industries hire employees with similar skill sets and shared occupational titles.
- Identify occupations in the emerging areas most relevant to community colleges.
- Project employment growth for the identified occupations.
- Validate employer challenges to recruit, hire and retain their workforce.
- Define skill sets and education requirements.
- Identify existing as well as planned college courses and programs; inform program expansion and/or adaptation.

Industry Overview

Each of the five emerging sectors in game development is profiled below.

Serious Games and Simulations

As video gaming has grown, it has moved beyond traditional console entertainment. Gaming has merged with other industries to develop new products with different objectives. Games are now being developed for serious purposes — training, education and persuasion — which has given rise to the term *serious games* or *simulations*.

Serious games are a type of “edutainment.” Interactive, 3D game technology is used to provide content that simulates real world scenarios to produce learning outcomes. Serious games allow learners to experience situations that are impossible in the real world for reasons of safety, cost, and time (physician surgical techniques and airline pilot maneuvers). Research indicates that the games have positive impacts on the players’ development of a number of different skills, such as complex decision-making, repetitive body motions for fitness, and cognitive development.

Whereas the military was one of the earliest adopters of serious games (military tactical and strategic simulations and training), it has now been joined by a long line of users, including other government agencies (for emergency management, first-responder training and political games); healthcare providers (for patient education and disease management games); advertising and marketing firms (for product use and opinion research games); schools — both K-12 and universities — (innovative learning tools to enhance instruction and assessment in a variety of subjects); and Fortune 500 companies (for team building, leadership and sales training, and product education).

The following are some of the names by which serious games are known throughout these industries and others:²

- Educational Games
- Simulation
- Virtual Reality
- Alternative Purpose Games
- Edutainment
- Digital Game-Based Learning
- Immersive Learning Simulations
- Social Impact Games
- Persuasive Games
- Games for Change
- Games for Good
- Synthetic Learning Environments
- Game-Based “X”

Defining what constitutes a “serious game” is an ongoing debate. There are some who think serious games and simulation applications are more diverse than what are generally considered only for learning or training. On the following page, Table 1 provides an overview of the variety of games and their purposes that are being developed for major users. From the table, one can see that games are being used across many industries for multiple objectives such as:

- Improving human performance (training and skills development games)
- Investigating human behaviors (data collection, visualizations, opinion research)
- Sharing information and knowledge (product and safety information, continuous education)
- Advertising (advergames that promote a product, organization or viewpoint)
- Managing health (self-directed care and treatment, physical fitness or ‘exergaming’)

² Sawyer, Ben and Smith, Peter. Serious Games Taxonomy. Presentation at the Serious Games Summit, Game Developers Conference, San Francisco, CA, February 18, 2008.

Table 1: Taxonomy of Serious Games

Matrix of Various Types of Games Developed for Major User Segments for Different Objectives

	Games for Health	Advergames	Games for Training	Games for Education	Games for Science and Research	Production	Games as Work
Government & Non-Government Organizations	Public Health Education & Mass Casualty Response	Political Games	Employee Training	Inform Public	Data Collection/ Planning	Strategic & Policy Planning	Public Diplomacy, Opinion Research
Defense	Rehabilitation & Wellness	Recruitment & Propaganda	Soldier/Support Training	School House Education	Wargames/ Planning	War Planning & Weapons Research	Command & Control
Healthcare	Cybertherapy/ Exergaming	Public Health Policy & Social Awareness Campaigns	Training Games for Health Professionals	Games for Patient Education & Disease Management	Visualization & Epidemiology	Biotech Manufacturing & Design	Public Health Response Planning & Logistics
Marketing & Communications	Advertising Treatment	Advertising, Marketing with games, product placement	Product Use	Product Information	Opinion Research	Machinima	Opinion Research
Education	Inform About Diseases/Risks	Social Issue Games	Train Teachers/ Train Workforce Skills	Learning	Computer Science & Recruitment	P2P Learning Constructivism Documentary	Teaching Distance Learning
Corporate	Employee Health Information & Wellness	Customer Education & Awareness	Employee Job Training or Workforce Training	Continuing Education & Certification	Advertising/ Visualization	Strategic Planning	Command & Control
Industry	Occupational Safety	Sales & Recruitment	Employee Training	Workforce Education	Process Optimization Simulation	Nano/Bio-tech Design	Command & Control

Source: Ben Sawyer and Peter Smith, Serious Games Taxonomy. Presentation at the Serious Games Summit, Game Developers Conference, San Francisco, CA, February 18, 2008.

According to Ben Sawyer, the current major investors in serious games and simulations for employee training, patient education and student learning are defense, healthcare and education. The fastest growing market sector is corporate training for employee learning and collaboration as they move into virtual world environments.³

According to some sources, \$1.5 billion will be spent on serious games worldwide in 2008.⁴ Overall, recent market trends have been quite positive. PricewaterhouseCoopers estimates the market in the United States for 2007 at approximately \$150 million per year, with the compound annual growth rates in the double digits for each of the last five years.

Despite the uncertainty of a standard business market model for serious games, many are optimistic about their commercial future. And while the serious gaming segment is still too young to have significant market numbers attached to it, it could capture a portion of the traditional gaming market (expected to reach \$44 billion by 2011, according to California-based research firm DFC Intelligence) over the next several years.⁵

Mobile Games

Mobile Games are games capable of being played on handsets, which may include voice communications as part of their core functionalities. While gaming on mobile phones is at an earlier stage of its evolution than either console or PC gaming, with mobile handsets everywhere, the opportunities for playing increasingly sophisticated mobile games are growing. Ease in downloading and playing games on a cell phone attract casual gamers, the market's number one target group, who play games for five-to-ten-minute periods.

The expansion of and access to wireless broadband is the most critical factor in the growth of mobile games. The 3G high-speed wireless technology can deliver higher bandwidth which will provide the platform for mobile gamers to get connected and get better game displays.⁶

The North American mobile gaming market is projected to grow from \$845 million to approximately \$1.2 billion by 2011.⁷

Casual Games

A fast-growing segment of the games market is casual gaming. Casual games are quick to access, easy to learn, and require no previous special game skills or regular time commitment to play. Many of these games come pre-installed in PCs, PDAs and mobile phones, and can also be easily accessed over the Internet. Also, casual games tend to be small and have minimal processing needs, making them ideal for mobile devices, particularly cell phones. Popular casual games include Solitaire, Tetris, Bejeweled and Diner Dash.

According to the Casual Games Industry Association, over 200 million people play casual games each month.⁸ The market for casual games is assessed at \$2.25 billion a year and is growing

³ Conversation with Ben Sawyer, www.gamesforhealth.com and www.digitalmill.com. August 8, 2008.

⁴ Alhadeff, Elaine. Serious Games, Serious Money: A Sizable Market Retrieved November 18, 2007 from <http://elianealhadeff.blogspot.com/2007/03/serious-games-serious>

⁵ DFC Intelligence. Worldwide Market Forecasts for the Video Game and Interactive Entertainment Industry, June 2008.

⁶ Mobile Gaming: A Big Money Play. Silicon Valley Business Journal. November 30, 2007.

⁷ Nyguen, Huy Tong. Dataquest Insight: The Outlook for Mobile Gaming. Gartner Research. May 2008.

⁸ Casual Games Market Report 2007. Casual Games Association.

over 20% per year.⁹ Advertising has become a huge revenue opportunity for casual games, as advertisers are after the casual game players' demographics.

Web 2.0

The new social media tools, grouped under the term 2.0, connect organizations and individuals in new ways and are transforming how companies communicate and market. Blogs, wikis, podcasts, RSS (web feed formats), tagging and social networks provide the ability to communicate with customers, and within and across businesses.

Virtual Worlds

The global popularity of virtual communities such as Second Life (SL), Active Worlds and There have added a new dimension to serious games.¹⁰ Corporations are looking at how they can use virtual worlds for employee learning, training and collaboration.¹¹ Diverse industry sectors are exploring the use of SL to create virtual work spaces. Many Fortune 500 companies and other large corporations and non-profits have sites on SL for meetings and conferences that are often linked to blogs and wikis. And an increasing number of businesses support the development of virtual worlds for companies and education institutions.¹²

Virtual worlds are some of the most active sites on the Web. About \$1.5 billion has been invested in companies developing technologies for virtual worlds in the past year and a half, according to a report published by Forrester.¹³

There are similarities between virtual worlds and serious games, and there are differences. Virtual world environments do the following: "Create a space for social interaction, let players act and react to each other and their environment in a big world, and create a persistent environment where people can visit and return."¹⁴

While the games that are played in virtual environments share some of the same technology platforms as serious games, there are differences. According to Tim Holt, a virtual world can be developed for any specific purpose (serious or not). But what people do in the virtual space defines their goals in that world (teaching assignments, training exercises). The space doesn't define what people do because of the nature of the social interaction of the virtual world.¹⁵

There are also large numbers of colleges and universities, and individual departments or faculty active in SL, not only for academic purposes but also for campus visits, recruiting activities for prospective students, and fundraising.¹⁶ Virtual worlds have the potential to provide support for learning communities, broaden networks of learners and provide tools to support learning activities.

⁹ Loughran, Julia. Casual Connect. July 30, 2008.

¹⁰ www.secondlife.com; www.activeworlds.com; www.there.com

¹¹ Virtual Worlds at Work Symposium. Engaging New Hires and Sales Force Training, April 28, 2008.

www.sric-bi.com

¹² www.virtualworldbuilders.com

¹³ Jackson, Paul. The Real Business of Virtual Worlds. Forrester Research, May 2007.

¹⁴ Holt, Tim. Landscape of Virtual World Systems. Presentation at Games for Health Conference, May 7, 2008.

www.perludus.com/timh

¹⁵ Email conversation with Tim Holt. www.perludus.com/timh

¹⁶ Serious Game Design Institute, www.seriousgamesdesigninstitute.org; and, Monroe Community College Builds Island on Second Life, Community College Week, February 27, 2008. www.monroecc.edu

Emerging Game Industries Workforce Structure, Products and Applications

Based on the primary research and executive interviews conducted, the industries that are increasingly connected to game development — both in the products that are being developed and the workforce needed to create the games — include the following:¹⁷

- **Advertising & Marketing** – A growing portion of advertising and marketing firms are developing casual games and interactive web applications that require many of the occupational skill sets that are taught in gaming curriculum.
- **Education & Corporate Consulting** – Educational games and training simulations are being developed by both educators and training consultants who are looking for innovative ways to educate students and train corporate employees.
- **Movies & Media** – Animators and graphic designers are increasingly working in both movie and television production and video game development. Studios are increasingly developing casual games that require developers from the gaming industry. More multi-media design firms are looking to develop games that gather information from consumers.
- **Science & Defense** – Agencies like NASA and the U.S Army have been developing serious games for years. In the past, these games were developed by consultants, but now, more of these games are being developed internally (NASA) or by small consulting game firms purchased by defense contractors.
- **Fitness & Healthcare** – A growing number of firms are developing games to support a healthy lifestyle and provide preventative healthcare along with new diagnostic tools to measure current health and fitness levels.

Additional information about the composition of the employer database and its data limitations can be found in Appendix C. Information about the survey methodology is located in Appendix K.

Differences between Large and Small Game Firms, and Supporting Industries

Larger Entertainment Game Firms

Representatives from larger entertainment game firms indicated that the marketplace for video games is changing and growing quickly. Traditional console games, which remain important to large firms, are likely to be just a segment of their focus in the future. Mobile and casual games are growing fast, attracting a different demographic gamer and becoming the focus of these firms. MMO (Massive Multiplayer Online) games, such as *World of Warcraft* — which use a console connected to the Internet that support multiple players — will likely be a greater focus as this market increases.

Smaller Firms Producing Serious Games

Representatives from the serious and educational game firms indicated they follow a similar process as the entertainment game firms in terms of how they develop games. The difference is that their hiring requirements are generally less specialized than the large entertainment game developers. (See Occupational Skills and Training Requirements on page 15.)

¹⁷ Eight executive interviews were completed with game development industry experts: three interviews with individuals that represented large game firms, three interviews with firms that produce serious and educational games, and two interviews with educational experts who develop curriculum and have worked with the gaming community.

Businesses that Support Game Firms

The businesses within these support industries are not necessarily creating new products, but are instrumental in supporting the development of new games. Many hire employees with similar skill sets and shared occupational titles as game development firms. These industries include:

- Graphic design services.
- Computer design and software development services.
- Financial, marketing and other business support services.

Location of California Companies

All 415 firms identified in the employer database developed for this study are indicated on a statewide map and two regional maps (Northern and Southern California) located in Appendix B. The maps demonstrate that regional distribution of emerging sector companies is largely concentrated in Los Angeles and Orange Counties, and the San Francisco Bay and Silicon Valley.

Several large and small game firms that are currently producing games in the emerging sectors of the industry are profiled in Table 2 below.

**Table 2: Sample of Large and Small Game Firms
Producing Games in the Emerging Sectors in California**

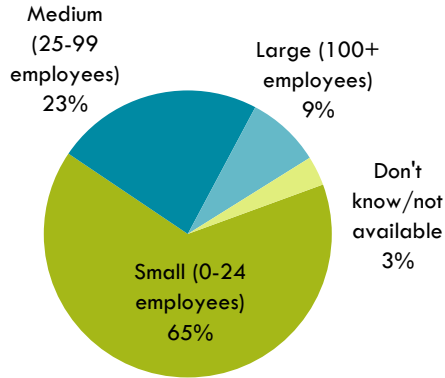
Company	City	Products/Services	# of Employees*
Electronic Arts	Redwood Shores	Entertainment & Serious Games	3,000
THQ	Agoura Hills	Entertainment & Serious Games	950
Sony Computer Entertainment	Foster City/ Los Angeles	Entertainment Games (hardware & software); Publishing; Mobile & Casual Games, and Virtual Environments	600
Redhill Studios	Larkspur	Serious Games, Interactive Media, Educational Games and Research.	10
Realtime Associates	El Segundo	Entertainment Games, Serious Games, Simulations	20
Qube Learning	Larkspur	Serious Games, Corporate Training & Learning Games	15

*Number of employees may include those working in different locations in the state.

Industry Size

Of the firms studied, most (65%) are relatively small (under 25 employees), with a significant portion (28%) employing 5 or fewer employees.

Figure 1: Emerging Non-Entertainment Game Firms in California by Employment Size



As with most industries, the smallest group of firms (226 or more employees) account for the most jobs (3,120 or 32.4% of the total industry employment of the sample). Further, the data indicates that 9% of firms (large or 100+ employees) account for 62% of the employment in the industry; in contrast, small and medium firms combined account for only 38% of employment.

Table 3: Estimated Employment of Emerging Non-Entertainment Game Firms by Size

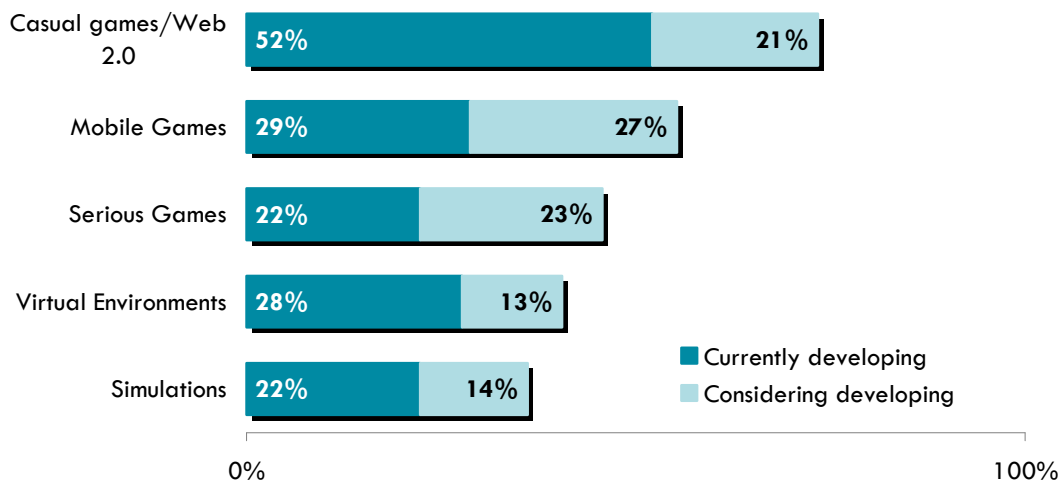
number of employees	number of firms	estimated employment	percent of total employment
5 or less	119	180	2%
6 to 10	75	380	4%
11 to 24	75	740	8%
25 to 49	71	1,420	15%
50 to 99	27	930	10%
100 to 225	27	2,840	30%
226 or more	9	3,120	32%

Game Applications Being Developed and Considered for Future Projects

Figure 2 below displays the types of game applications employers are currently developing and are considering for future development. The data supports the fact that the employer database developed for this study targeted firms largely in the emerging sectors.

- Over half of employers (52%) are developing casual games, with an additional 21% considering developing them.
- More than one-quarter (29%) of the firms currently develop mobile games and an almost equal amount (27%) are considering mobile games as future projects.
- Close to 46% are currently developing or considering developing serious games.
- More than 40% of employers are either currently developing or considering developing virtual environments.
- A third of survey respondents indicated simulations were either being developed or are being considered for development.

Figure 2: Games Currently Developed and Considered for Future Development



Current Employment and Industry Growth Expectations

Responding companies indicated they currently employ approximately 9,610 workers in all occupations.¹⁸ Based on survey data, three out of four employers are increasing their hiring in the next 12 months — projected to be 1,830 new jobs — a 19% increase.

Employment: Regular versus Temporary or Contract Basis

Almost half of employers (47%) hire some of their employees on a temporary or contract basis. More than 16% of employers surveyed hire most or almost all of their staff on a temporary or contract basis.

¹⁸ Includes all full-time, part-time and contract or temporary employees.

Occupational Overview

Occupations Studied

Choosing occupations in the emerging, non-entertainment sectors was a key research objective of this study. For inclusion, the occupation had to be easily served by community college programs and relevant to employment in the game industry. The eight occupations studied are listed below.¹⁹ Occupational definitions are located in Appendix D.

- Entry-level programmers or software engineers
- Character or 2D animators
- Quality assurance technicians or testers
- Production assistants
- 3D modelers and animators
- Technical artists and graphic designers
- Interactive web programmers or developers
- Writers and content developers

Projected Growth for Each Occupation

Table 4: Estimated California Current Employment and 12-Month Growth for Each Occupation Studied

Occupation	Estimated 2008 Employment	Growth Next 12 Months	Openings from Growth	Projected Employment Next 12 Months
Entry-level programmers or software engineers	1,380	24.8%	340	1,720
Quality Assurance Technicians or Testers	740	34.3%	250	990
Technical Artists and Graphic Designers	570	31.7%	180	750
Interactive Web Programmers or Developers	560	22.8%	120	680
Writers and Content Developers	480	28.9%	140	620
Character or 2D animators (including Flash animators)	450	28.2%	160	610
Modelers and Animators	440	35.8%	130	570
Production Assistants	350	36.7%	130	480
Summary (Growth represents an average growth rate for all 8 occupations.)	4,970	29.2%	1,450	6,420

¹⁹ Occupations identified from input from executive interviews with six industry leaders, MEI Center Directors, and MEI Statewide Director.

Based on the preceding table, in the next 12 months, the combined growth of these eight occupations could result in more than 1,450 of the 1,830 new jobs projected for the emerging industry sectors.²⁰

All eight occupations show significant growth over the next 12 months, with production assistants (37%) and modelers/animators (36%) having the fastest projected growth. The largest occupation of the eight studied is programmers/software engineers with a growth of 340 new jobs specific to the game industry.

Occupations Employed by Firms and Those Outsourced

Table 5 below shows the percent of firms employing each occupation (a combined percentage of respondents who answered “yes, at this location” and “done by this company at another location”); the percent of firms outsourcing this occupation to a vendor; and the percent of firms that responded this occupation was not needed in their business.

Table 5: Percent of Game Firms Employing Each Occupation and Percentage of Outsourcing

Occupation	% of Firms Employing Each Occupation	% of Firms Outsourcing Occupation to Vendor	Not needed	Don't know/ No answer
Writers and Content Developers	68%	12%	15%	5%
Technical Artists and Graphic Designers	63%	19%	12%	6%
Production Assistants	62%	7%	26%	6%
Entry-level programmers or software engineers	62%	14%	19%	5%
Quality Assurance Technicians or Testers	59%	23%	14%	4%
Interactive Web Programmers or Developers	57%	20%	17%	6%
Modelers and Animators	46%	24%	25%	6%
Character or 2D animators (including Flash animators)	44%	23%	22%	9%

Occupational Skills and Training Requirements

The employer survey results show that in the near future the emerging sectors of the game industry, plus those industries that support the game industry, will need a supply of additional entry-level and experienced workers. All information sources support the fact that games for serious purposes and simulations, mobile and casual games and virtual environments, especially for use in healthcare, defense, education and corporate training, are on the rise.

Career Pathways

Career pathways exist in the game industry with opportunities for promotion and career advancement based on experience and education. A table of **career paths** in the game industry is located in Appendix E. Industry **salary information** for the major game occupations is located in Appendix F.

²⁰ The 1,830 new jobs represent all employment within this sector. The 1,450 jobs represent the new job growth in the eight occupations studied.

While there was little agreement among employers on standard career pathways in gaming, there was some agreement on good entry-level positions which include production assistants, entry-level programmers/software engineers and technical artists.

From a human resources perspective, the **larger firms** are looking for specialists in programming, graphic design and marketing. They typically require a master's degree or at least a bachelor's degree for many of their entry-level positions. The larger firms support the idea that entrants to the game industry should focus on programming, art or management. They indicated that designing games becomes a skill that is developed once the person has experience in the industry and an understanding of the three core areas of expertise.

For small firms **specializing in serious games**, the occupational requirements are generally less specialized than the large entertainment game developers. They are more likely to have smaller teams that are composed of generalists, working on a broader array of components in game development. Programmers, for example, need to have a broader understanding of the project and will likely be involved in more aspects of the game development.

The community college may serve the gaming industry by focusing on developing the generalists and providing transfer opportunities for those individuals that want to be specialists.

Foundational Skill Sets

Employers consistently indicated that technical art, programming and game design were the three pillars of game development skills. However, employers and industry experts discussed the importance of project management (schedules, milestones, contracting) and writing as core skills that need to be developed.

Instructional design is a specific need of serious and educational games that is unique to this facet of game development.

The following were the top five technical skills and knowledge areas for entry-level employees according to survey respondents:

1. Knowledge and ability to program in object-oriented computer languages.
2. Knowledge and understanding of artistic design fundamentals.
3. Knowledge and understanding of the game design process (C++).
4. Working knowledge of 3D modeling.
5. Working knowledge of electronic gaming and virtual environments.

Employer Needs and Challenges

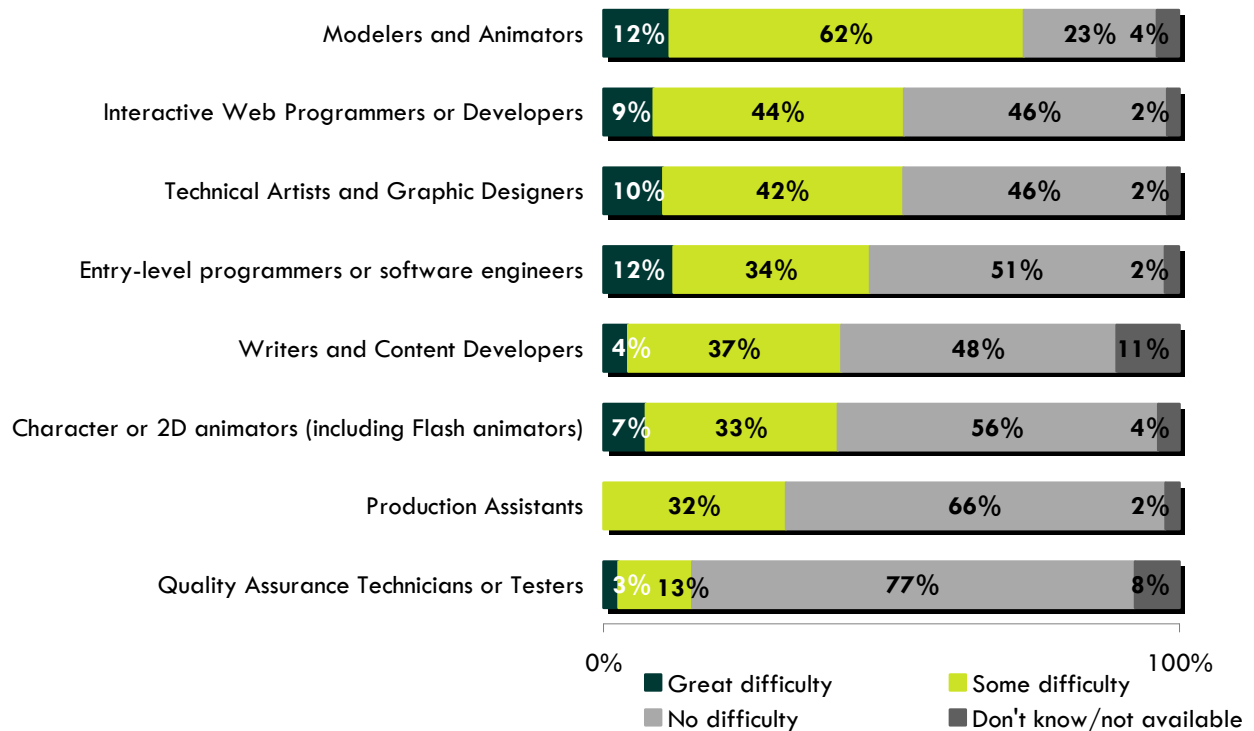
The gap between the demand for game occupations and the available supply of qualified candidates is indicated by the difficulty firms have recruiting both entry- and non entry-level employees, and the projected growth in all eight occupations studied.

Hiring Difficulties

Employers responding to the survey indicate difficulty in hiring for all eight occupations studied as show in the figure below. In particular:

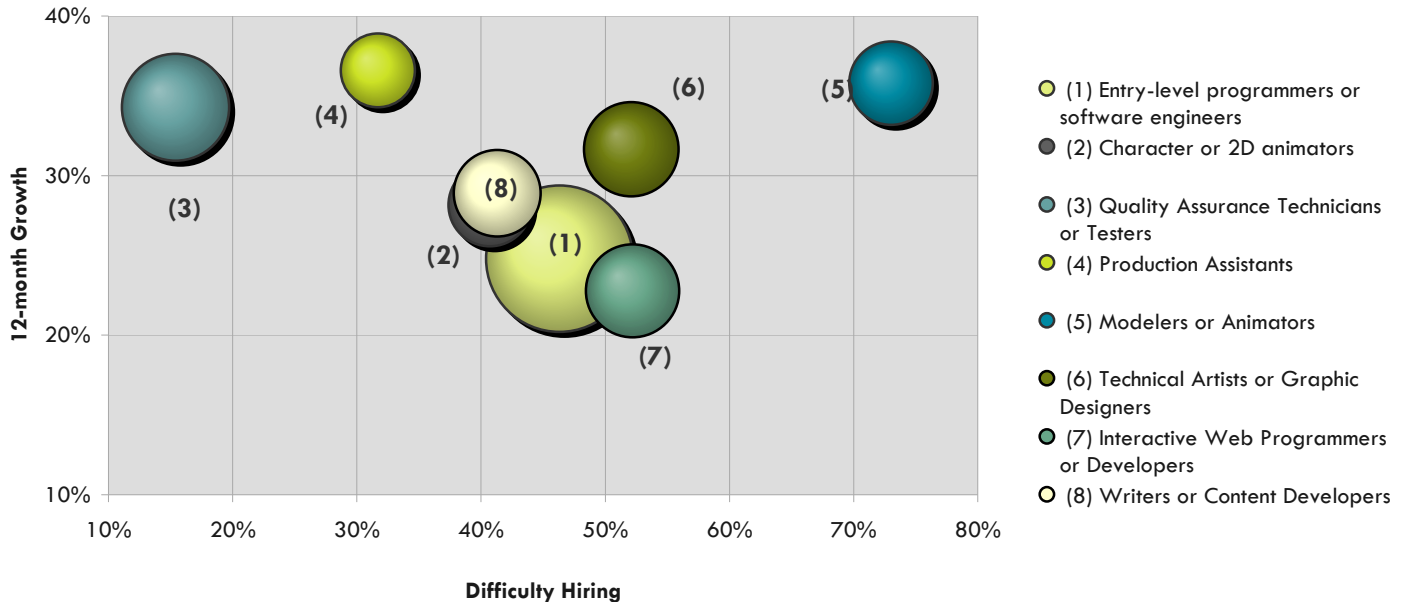
- More than 70% of employers find it difficult to hire modelers and animators.
- Half of employers find it difficult to staff interactive web programmers/developers, and technical artists/graphic designers.

Figure 3: Level of Difficulty Finding Applicants for Each Occupation Studied



In the bubble chart on the following page, the relationship between difficulty in hiring and expected growth for each of the eight occupations is revealed. The area of each bubble represents the size of current employment for each occupation.

Figure 4: Difficulty in Hiring and Expected Growth in Each Occupation Studied

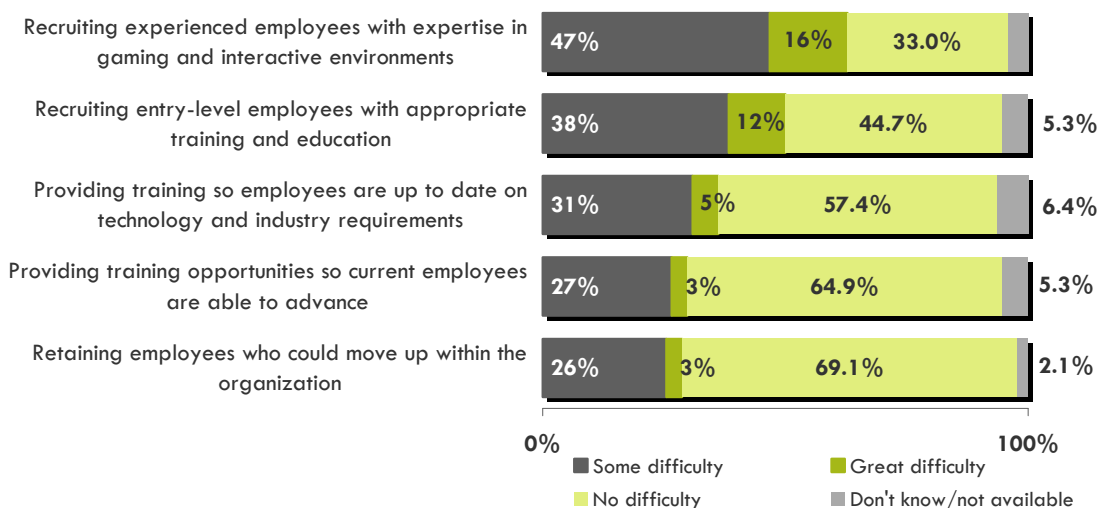


Workforce Challenges

Figure 5 below shows the difficulty employers are facing recruiting qualified workers, and training and retaining existing employees.

- Three out of five employers experience difficulty recruiting experienced employees with expertise in gaming and interactive environments.
- Half of employers surveyed report difficulty recruiting entry-level employees with appropriate training and education.
- More than one-third of employers find it difficult to provide training so employees are up-to-date on technology and industry requirements

Figure 5: Workforce Challenges for Game Employers in the Emerging Sectors

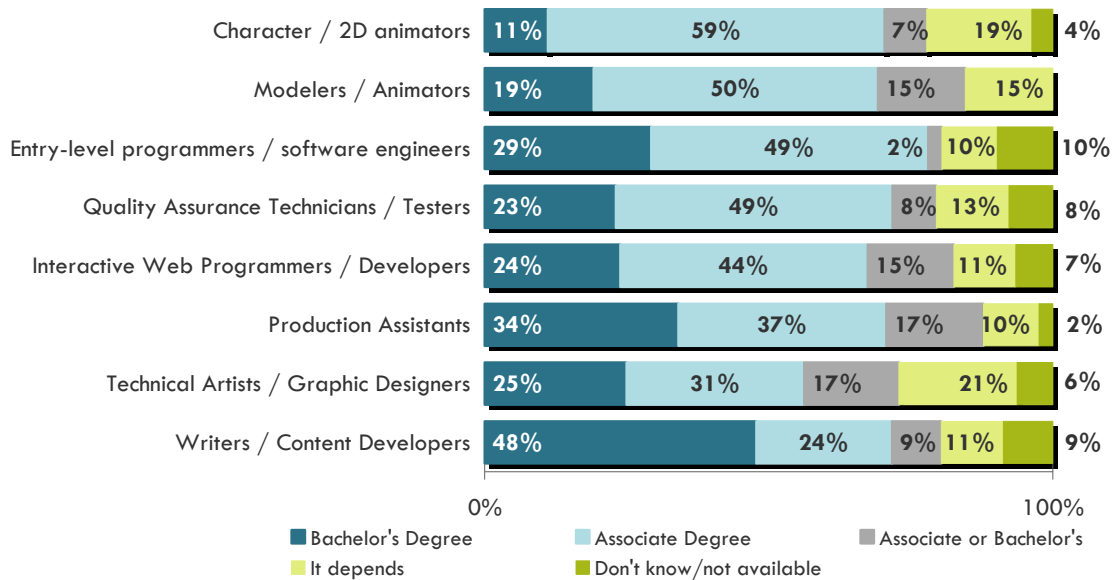


Occupational Outlook

When asked about their preferences for hiring candidates with different educational backgrounds, employers indicated that they:

- Prefer a post-secondary degree (either bachelor’s or associate degree) for all eight of the occupations profiled (more than 73%).
- Applicants with an associate degree are preferred over a bachelor’s degree for seven out of the eight occupations studied.
- Prefer applicants with a specific associate degree for character or 2D animators (59%) and modelers/animators (50%).
- Prefer writers and content developers to have a bachelor’s degree (48%).

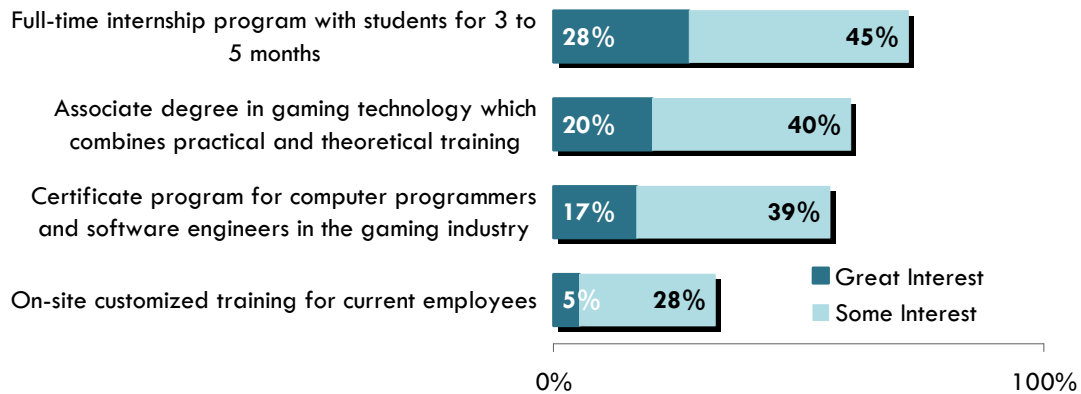
Figure 6: Education and degree preferences for each of the eight occupations



Workforce Development Opportunities

Employers expressed great interest in education and training programs that can be developed by the California Community Colleges. Figure 7, on the following page, shows the employer interest (great and some) in a variety of programs in order of highest to lowest interest:

- A full-time internship program with students for 3-5 months (73% expressed interest).
- An associate degree in gaming technology that combines practical and theoretical training (60% expressed interest).
- A certificate program for computer programmers and software engineers in the gaming industry (56% expressed interest).
- On-site customized training (through college contract education units) for current employees (33% indicated interest).

Figure 7: Employer Interest in Community College Programs

Provide Better Internships

Employers agreed on the importance of work experience and internships in developing new skilled employees for the gaming industry. A comprehensive training curriculum in gaming should include a full-time, three-to-five-month internship at a game development company or a peripheral company that is engaged in some type of game development.

Employers' Interest in California Community College Game Development Programs

- A substantial number of responding employers (more than 40%) said they are interested in **advising colleges** in the development of programs and curriculum.
- An overwhelming 77% of firms are interested in **receiving future information** about the community college game programs.

College Response and Issues

California Community Colleges were surveyed on the courses, certificates and programs they have developed or plan to create to meet the need for skilled workers in the emerging sectors of the game industry.

Surveys were sent to faculty who indicated an interest or participated in Multimedia and Entertainment Initiative (MEI) sponsored game development training events, conferences and workshops. The survey was e-mailed on May 19, 2008, and re-sent on May 27th and July 2nd to increase responses. The California Community College Taxonomy of Programs (TOP) was searched and colleges listing programs under TOP code 614.20, Electronic Game Design, were also sent a survey.

Survey Questionnaire

Contact information for the college respondent is in Appendix H. The survey questionnaire can be found in Appendix L.

1. A summarization of the 15 college responses on current game courses, certificates and degrees, and the occupations for which they prepare can be found in Appendix I.

2. Tables detailing college responses on their future courses and programs, advisory boards, internships, industry training, and ability to hire faculty can be found in Appendix J.

A report of the detailed responses from the survey, *Survey of Game Development Programs*, is available at the Center of Excellence website at www.coecc.net and the MEI website at <http://cccmei.net/gamestudies>. Other summary data from the survey is also contained in this report.

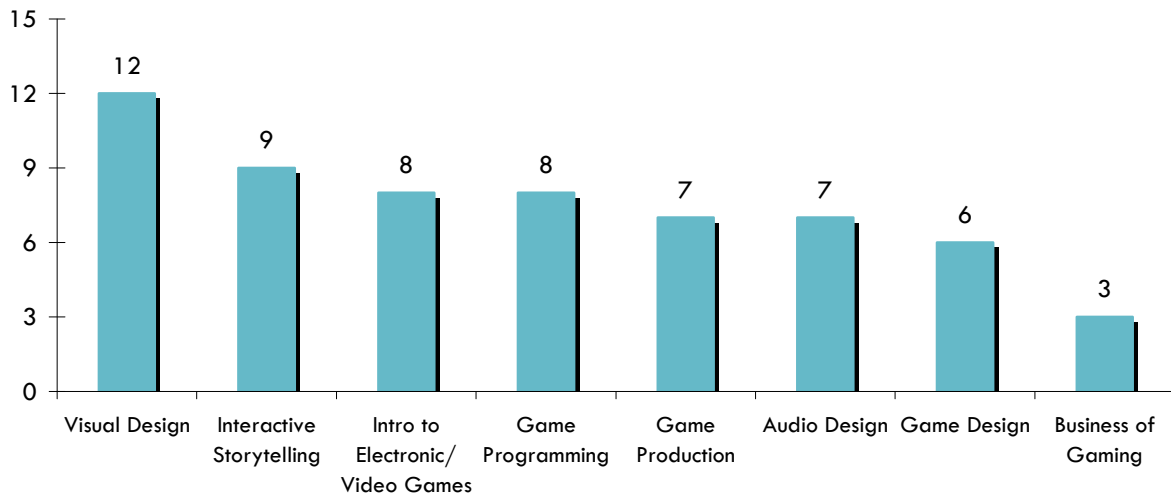
Summary of Survey Responses

Fifteen California Community Colleges responded to the survey.²¹ Key findings are summarized below and the entire results are available in the appendix.

Current Course Offerings

Three to 12 of the responding colleges indicated they offer game development courses within the IGDA Curriculum Framework core topic areas. Figure 8 shows the number of colleges who offer courses in each of the topic areas.

Figure 8: Colleges Offering Game Development Courses within IGDA Core Topic Areas

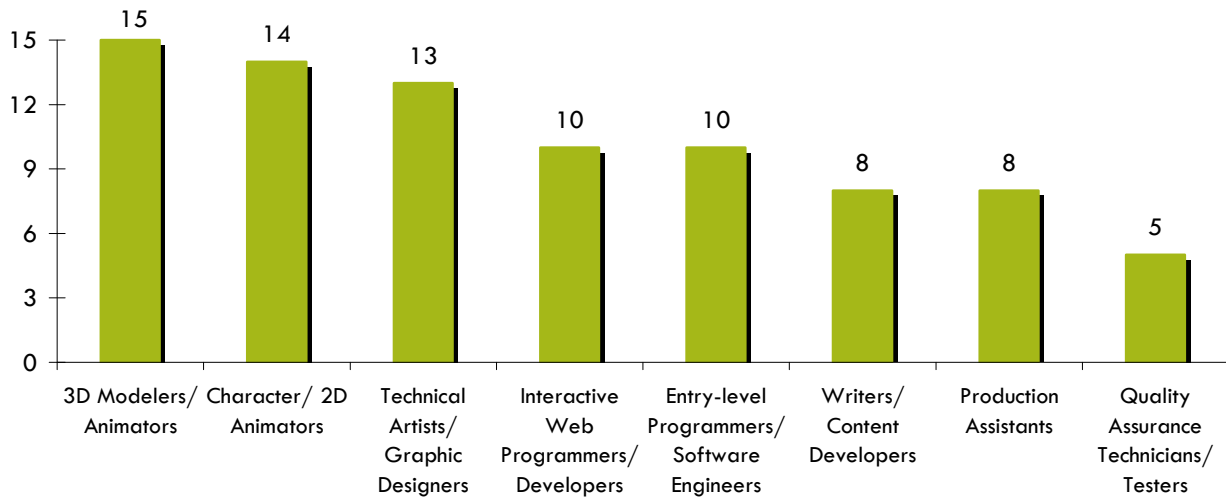


²¹ Each college did not respond to each question.

Occupational Preparation

Eight to 15 of the responding colleges indicated they offer courses that prepare students for each of the eight game development occupations studied in this report. Figure 9 shows the number of colleges who offer courses, certificates, and programs related to each occupation.

Figure 9: Courses Offered by Colleges that Prepare for Game Development Occupations



Future Course Development and Difficulty Finding Faculty

Ten colleges that responded to the question on future course development say they are planning new courses that will be ready between Fall semesters 2008 and 2010. Five colleges indicate they have difficulty finding faculty to teach at least one course in their current game programs.

Internships, Outreach to High Schools, Industry Partnerships and Advisory Boards

Colleges who responded offer internships for students and engage in some form of outreach to high schools. Most colleges have well-developed advisory boards that guide program development. Five of the colleges responded to indicate they have some level of partnership with industry associations and/or employers, however, responses indicate that colleges want to do more in this area. All but one college have well-developed advisory boards.

Community Support and Resources

The emerging sectors of the non-entertainment game industry are growing and changing rapidly. College faculty and staff can stay informed through membership and participation in a variety of industry associations, listservs, blogs and forums available for the exchange of information and ideas with game practitioners, employers, and fellow educators.

Resources and partnership opportunities are included in the table below.

Partner/Resource	Type of Organization	Contribution
Multimedia & Entertainment Initiative www.cccewd.net or www.cccmei.net See Appendix G for Regional Center contacts	California Community College Economic & Workforce Development Initiative Program	Partnerships with Industry Labor Market Studies & Occupational Outlook Information Faculty Training Curriculum Development Technical Assistance and Resources
Serious Game Design Institute Santa Barbara Community College www.seriousgamedesigninstitute.org Jim Kiggins, Director	Community College Program MEI Regional Center	Education Programs Faculty Training Resources and Technical Assistance
International Game Developers Association www.idga.org	Industry Association	Network with Game Professionals & Connect with Peers Professional Development Events Access to Employers Resources and Technical Assistance
IGDA Education Special Interest Group www.idga.org/education Listserv: game_edu@igda.org (Additional SIGs: Casual Games, Serious Games, and Mobile Games)	Game Educators Special Interest Group	Community of Game Educators Knowledge Base for Game Development Industry-Defined Education Standards Curriculum Development Teaching Methods Training Events Student Outreach & Internships
Listservs: Serious Games seriousgames@listserver.dmill.com website: www.seriousgames.com Games for Health games-for-health@listserver.dmill.com website: www.gamesforhealth.com Games for Change www.gamesforchange.org/joinlist	Websites and Listservs	Develop community and best practices in serious games, healthcare, and social issues/social change applications.
www.imserious.net	Blog	Information and Idea Exchange
www.virtualworldsnews.com	Website	Information on Virtual Worlds

Partner/Resource	Type of Organization	Contribution
www.gamasutra.com	Online Game Development Resource	Game Industry Information: News, Features, Jobs, Companies, Education, Product Guide
American Institute of Graphic Arts www.aiga.org	Industry Association	Information Exchange for Design, Research and Education.
North American Simulations and Gaming Association www.nasaga.org	Industry Association	Network of Game Professionals Focus on Games to Improve Learning in Education, Training, Management
International Simulation and Gaming Association www.isaga.com	International Organization	The Science for Game Developers
Digital Games Research Association www.digra.org	Industry Association	Interdisciplinary Academic Study of Digital Games
SIGGRAPH (Special Interest Group on Graphics and Interactive Techniques) www.siggraph.org Parent organization: Association for Computing Machinery (AMC)	Professional Membership Organization	Community of Computer Graphics / Interactive Technique Professionals Information Sharing Annual Conference Regional Chapters & Workshops
www.gamedev.net	Online Community	Game Developer Information: Jobs, Resources, Forums & Chats, Workshops
www.devmaster.net	Game and Graphics Engine Databases	Up-to-date information on game engines, features, and reviews.
www.devbump.com	Online Community	A new site for information and idea sharing among game developers
Workforce Investment Boards (WIBs) and One-Stop Centers www.calwia.org/lwia Link to Local Workforce Areas and regional WIB office contact information.	Public Workforce Development Agencies	Access to Job Seekers (dislocated workers) Access to Employers Training Funds Employment Resources
Regional Colleges and Community College Consortia Bay Area Community College Consortium (BACCC) www.baccc.org Los Angeles Community Colleges (LOWDEL) www.laocrc.com South Central Regional Consortium (SCRC) www.scrc.cc	Regional Community College Workforce Training and Development	Education and Training (Associate Degrees, Certificates, Basic Skills; Incumbent Worker Training via Contract Education) Regional Staff Development Disseminate Best Practices Grant Funding and Assistance

Conclusions and Recommendations

The Multimedia and Entertainment Initiative (MEI) in collaboration with the Centers of Excellence (COE) studied the workforce needs of emerging non-entertainment sectors within the larger game industry for California Community Colleges for additional employment opportunities for students.

Firms identified in the emerging game sector, and those industries which are connected to game development, are projected to increase employment substantially in the state within the next 12 months. Additionally, there is a gap between the demand for game occupations and the available supply of qualified candidates, as game firms expressed difficulty recruiting both entry- and non entry-level employees in all eight occupations studied.

A number of colleges around the state are already developing and offering game development instructional programs, largely for the entertainment game sector. An overview of some of these programs, along with future course development can be found in this report.

Due to the existing program infrastructure and with the services and support provided by the MEI, colleges may be well-positioned to build a pipeline of skilled workers, create and expand industry partnerships and provide additional professional development for college faculty in these new technologies

This Environmental Scan supports the creation, adaptation, or expansion of game development education programs at California Community Colleges to meet the increasing demand of employers, and provide additional employment opportunities for students.

Recommendations

1. Create and expand industry partnerships.

- Use database of employers developed from this study for marketing and outreach. This can be accessed by contacting the MEI Statewide Director. See Appendix G for contact information.
- Enlist employer advisement assistance to develop programs and curriculum.
- Establish regional advisory boards to assist multiple, adjacent colleges, to identify the education and employment skills in demand.
- Identify employers who want to partner with colleges for student internships.

2. Build a pipeline of skilled workers.

- Work with model programs like Santa Barbara Community College's Serious Game Design Institute for best practices to market to potential students and provide curriculum that prepares for employment in the emerging sectors.
- Develop full-time, three-to-five-month internships at a game development company or related firm.
- Focus on game development skills such as technical art, programming and game design. Include management and writing as core skills within programs.

3. Provide on-going professional development for college faculty.

- Offer symposia and forums on the emerging game industry sectors.
- Enlist employers to inform colleges on needed skill sets, educational preparation and curriculum in the emerging industries.
- Continue serious games and simulations curriculum faculty workgroup.
 - a) Research game technologies
 - b) Develop curriculum
 - c) Train-the-trainer on instructional methods and materials
 - d) Obtain software and other game technologies.
 - e) Disseminate best practices.
- Support further research in emerging game industry technology, curriculum development, and other methodologies, for best practices in course development and/or faculty training.

4. Encourage and support faculty membership and involvement in industry associations such as International Game Developers Association (IDGA), among others.

- Conduct a membership drive for IGDA membership and SIG Education Chapter.
- Build a “critical mass” of faculty and staff that regularly participate in the Education SIG Chapter.
- Ultimately form an IDGA Education SIG specifically for California Community Colleges.

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International Game Developers Association. www.igda.org

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There. www.there.com

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Virtual Worlds at Work Symposium. Engaging New Hires and Sales Force Training, April 28, 2008. www.sric-bi.com

Appendix A: How to Use this Report

About the Centers of Excellence

The Centers of Excellence (COE), in partnership with business and industry, deliver regional workforce research customized for community college decision making and resource development. This information has proven valuable to colleges in beginning, revising, or updating economic development and Career Technical Education (CTE) programs, strengthening grant applications, assisting in the accreditation process, and in supporting strategic planning efforts.

The Centers of Excellence are part of the California Community College's Economic and Workforce Development Network. The Centers aspire to be the premier source of regional economic and workforce information and insight for California's community colleges.

More information about the Centers of Excellence is available at www.coecc.net.

How to Use This Report

This report is designed to provide current industry data to:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Influence and inform local college program planning and resource development;
- Promote a future-oriented and market responsive way of thinking among stakeholders; and,
- Assist faculty, Economic Development and CTE administrators, and Community and Contract Education programs in connecting with industry partners.

The information in this report has been validated by employers and also includes a listing of what programs are already being offered by colleges to address those workforce needs. In some instances, the labor market information and industry validation will suggest that colleges might not want to begin or add programs, thereby avoiding needless replication and low enrollments.

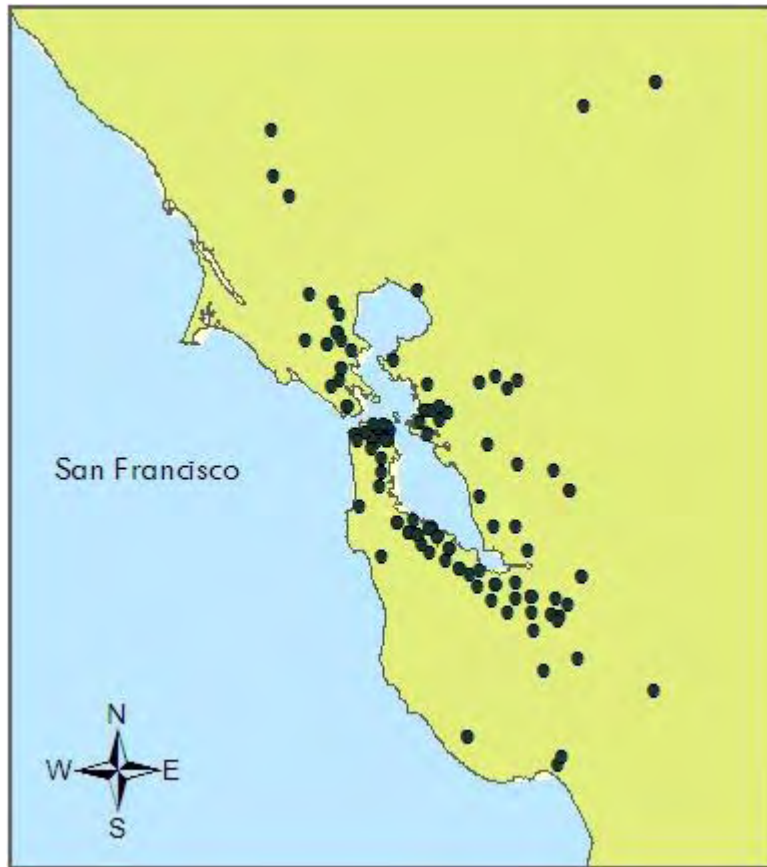
Important Disclaimer

All representations included in this report have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings; however, neither the Centers of Excellence, COE host District or California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon components or recommendations contained in this study.

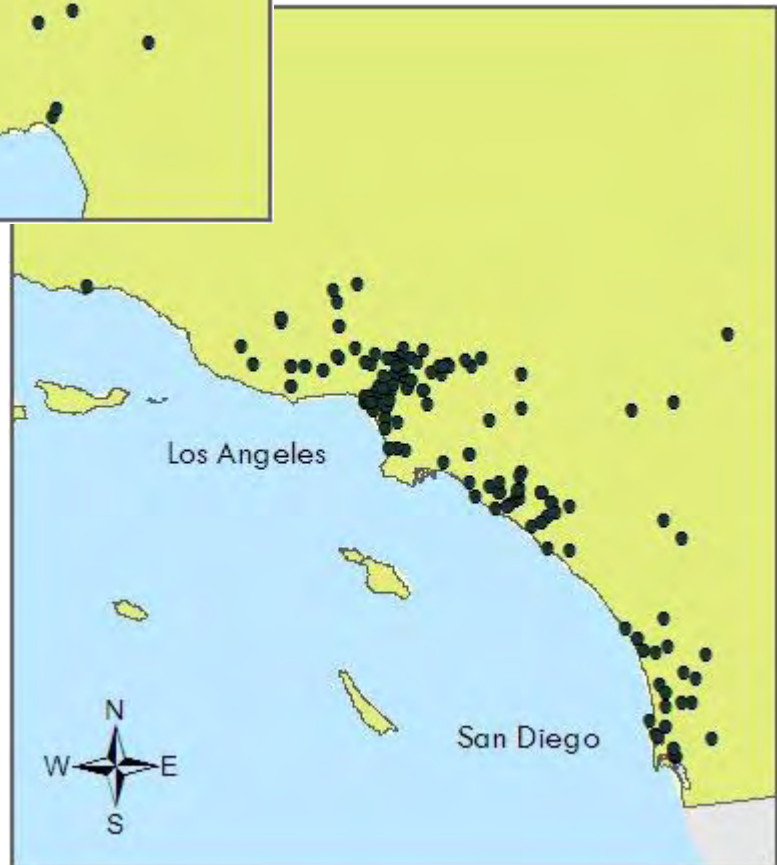
Appendix B: Employer Locations in California

60% are located in Southern California and 40% in Northern California. The largest concentrations are located in the Bay Area (37%), Los Angeles (24%) and Orange County (19%). Secondary concentrations are found in San Diego (8%), and both Ventura and Inland Empire at 5% each.





Employer Locations in Northern California



Employer Locations in Southern California

Appendix C: Employer Database and Data Limitations

The primary research for this study provides valuable information on the state of workforce needs within the emerging industry. However, certain considerations should be made when examining or using the data.

A. Defining Game Firms in Emerging Sectors

Unlike more mature industries that can be defined by industry classifications and found at InfoUSA, Dunn and Bradstreet or Hoovers, the game employer database built for this study was compiled through contact information of each firm based on discussions with industry experts, information provided by the MEI and COEs, and through BW Research extensive Internet research. Special attention was given to locating and including game employers that were in serious, casual and mobile gaming, and virtual worlds. While the database of firms in California numbers 415, it is possible that other game firms exist, but were not accounted for. For example, firms with contact information that could not be confirmed were removed from the database.

B. Defining Businesses that Support Game Firms

One objective of the study was to identify which industries are connected to game development and hire employees with similar skill sets and shared occupational titles. After speaking with industry experts and examining secondary research, a database of firms was developed in different industry classifications that would be most likely to hire individuals with similar titles and occupational skill sets as game employers.

Using InfoUSA, a database of firms with at least five employees was developed from employers in the following sectors (with corresponding NAICS codes)²²

- Motion picture & video production (NAICS 512110)
- Graphic design services (NAICS 541430)
- Custom computer program services (NAICS 541511)
- Advertising agencies (NAICS 541810)

Survey results with employers from this secondary database indicated that none of these industries had a high proportion (more than 30 percent) of firms that hired game development occupations. However, closer examination of the database revealed that some game firms were classified within these four industries, particularly within graphic design services and custom computer programming services.

It should be noted that there are other industries where game development workforce opportunities exist, such as healthcare, training and consulting, defense, education and research. However, these firms were not included because of the low concentration of these employers that hire game occupations.

²² North American Industry Classification System (NAICS).

Appendix D: Occupation Definitions

Entry-level Programmers or Software Engineers: Entry-level programmers can fall under a broad range of programming positions including, engine programmer, network programmer, gameplay programmer, and visual effects programmer. These positions often require the ability to program in C/C++ and/or other object oriented languages.

Character or 2D Animators (includes Flash Animators): These positions typically require an understanding of traditional character animation and can include positions such as animators and effects animators. Individuals in this job category often are required to be familiar with different software applications (Flash) that support the animation of gaming characters.

Quality Assurance Technicians or Testers: Testers and quality assurance technicians are typically used at the end of the production cycle to test and improve games. Testers are used to identify any and all bugs and or problems with a game before it is finalized for production. Bigger firms will have different types of testers including graphics testers and gameplay testers.

Production Assistants: This is typically defined as the entry-level position into game production and management. Applicants should have a general business background with specific experience in the gaming industry. This position typically reports to an assistant or associate producer and can also be an entry into game design.

3D Modelers or Animators: 3D modelers or animators are meant to create characters and virtual environments that are three dimensional. These occupations typically require expertise in different software applications that develop 3D characters and environments. These positions also typically require a strong background in traditional animation and can often work in movie and television studios along with video game development.

Technical Artists or Graphic Designers (includes environment artists and interface designers): This occupational category includes a broad range of gaming occupations that typically fall into the realm of the gaming artists including graphic artist, concept artist, special effects artist, technical artist or interface designer. These positions are typically supervised by the art director or art manager.

Interactive Web Programmers or Developers: Interactive web programmers or developers are responsible for developing online applications that support or are integral to online gaming. These positions often require the ability to program in different languages such as PHP/HTML, Java or Flash. Web programmers can also be involved in developing game portals, online credit systems, casual games, and localization of games to different markets.

Writers and/or Content Developers: Writers and/or content developers are responsible for working with the game designers to develop the narrative of the games. This position requires strong technical writing skills as well as the ability to develop or support the development of story boards. This occupation can also require the ability to document the development process and write new scenarios for a storyboard.

Appendix E: Career Path Information

The International Game Developers Association (IGDA) has provided information on career paths titled “Breaking In.” The paths are outlined below, but additional information can be accessed at www.igda.org/breakingin/career_paths.htm.

Area	Occupations	Comments on Entry-Level Jobs
Audio	<ul style="list-style-type: none"> • Sound Engineer/Designer • Composer/Musician • Audio Programmer/Engineer 	Generate games sound effects, compose music, write software to support sound
Production	<ul style="list-style-type: none"> • Producer/Project Lead • Project Manager • Associate Producer • Game Tester • Lead Tester 	Game tester detects bugs and reports to programmers. Lead tester supervises all testers and often trains them.
Visual Arts	<ul style="list-style-type: none"> • Intern Artist • 3D Model Builder (Objects) • 2D Conceptual Artist • 2D Texture Artist • 3D Cutscene Artist • 3D Character Builder • 3D Character Animator • Level Builder • Art Director • Art Technician 	Appears to be a lot of cross-over skills needed to be a multi-media artist and animator, although there are some unique software packages with which artists in this industry need to be familiar.
Programming	<ul style="list-style-type: none"> • Junior Programmer • Lead Programmer • Engine/Tools Programmer • Graphics/Special Effects Programmer • Audio Programmer/Engineer • Artificial Intelligence Programmer • Multiplayer Networking Programmer 	Code is the core stuff of games. 3D graphics programming is a must. Also helpful are: AI, 3D math, physics, sound programming, collision systems, game design theory. C/C++ is a very common program used in the industry.
Design	<ul style="list-style-type: none"> • Game Designer • Lead Designer • Level Designer • Fiction Writer/Screenwriter 	Level designers build the interactive architecture for a segment of the game. Screenwriter creates the backstory, writes character dialogue.
Biz & Misc.	<ul style="list-style-type: none"> • Support staff • Human Resource Managers • Managers • Marketing/PR • Sales • Systems Administrators • Accounting/Business • Legal Staff (Content Acquisition & Licensing) 	Traditional business careers meet game passion.

Appendix F: Industry Salary Survey

Game Developer Magazine conducts and publishes an annual salary survey. The table below shows the results from the 7th Annual Salary Survey published in April 2008 that rank average salaries of those employed in the game industry by years of experience in seven occupational groups.²³ The overall average salary of all occupations is \$73,600—slightly up from 2007 at \$73,000—but far exceeding California’s overall annual average pay of \$47,084.²⁴

Occupations	< 3 Years Experience	3 - 6 Years Experience	> 6 Years Experience	Overall Average Salary
Programmers and Technical Directors	\$57,665 - \$80,833	\$75,070 - \$111,250	\$94,525 - \$128,676	\$83,383
Artists and Animators	\$43,657 - \$40,417	\$58,452 - \$81,071	\$74,335 - \$102,806	\$66,594
Designers and Creative Directors	\$46,208 - \$51,731	\$54,716 - \$60,833	\$74,688 - \$98,370	\$63,649
Producers and Project Leads	\$46,667 - \$62,500	\$55,833 - \$93,611	\$65,147 - \$125,000	\$78,716
Testers and QA Leads	\$25,142 - \$38,611	\$38,553 - \$41,905	\$43,056 - \$70,658	\$39,063
Audio Designers/ Engineers and Composers/Musicians	\$64,583	\$59,605 - \$80,192	\$83,214 - \$91,413	\$73,409
Business and Legal, including Marketing, PR, Sales, Executives, and other staff	\$50,595 - \$80,000	\$69,500 - \$76,324	\$101,429 - 132,305	\$101,848

According to the Salary Survey, most employees in the industry benefit from supplemental compensation, in addition to base wages, that include annual bonuses, project bonuses, royalties, stock options, and profit sharing.

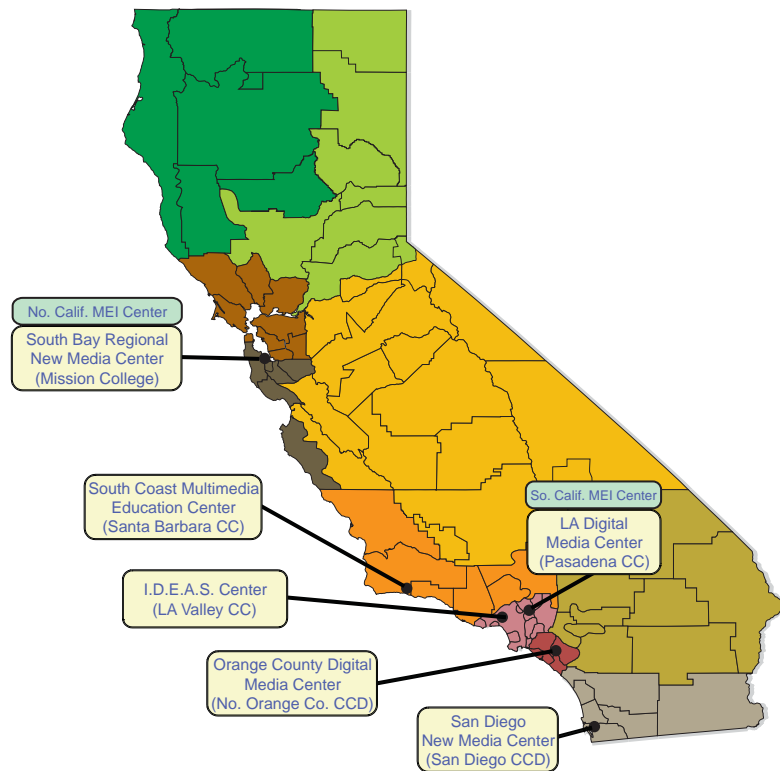
²³ *Game Developer Magazine*, April 2008, Volume 15, Number 4. www.gamedevelopermagazine.com

²⁴ Occupational Employment Survey, 1st Qtr. 2008, LMID/EDD. www.labormarketinfo.edd.ca.gov

Appendix G: Multimedia & Entertainment Initiative

Purpose: The Multimedia & Entertainment Initiative (MEI) is a statewide network of community college educators working in strategic partnerships with industry and community organizations to identify and meet California’s workforce and economic development needs.

Description: Consisting of an Initiative Director, six regional centers, two support hubs, and scores of affiliated colleges throughout California, the Initiative is committed to creating environments in which students can achieve artistic excellence and develop technological expertise for careers in the communications, entertainment, and interactive learning industries.



John Avakian, Statewide Director
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 E-mail: avakiani@cccwd.net
 Website: www.cccmei.net

Initiative Centers	Director
Mission College / Northern California New Media Center	Anna Szabados / anna_szabados@wvm.edu
Santa Barbara City College / South Coast Media Education Center	Jim Kiggins / kiggins@sbcc.edu
Los Angeles Valley College / Institute for Developing Entertainment Arts and Studies (IDEAS)	Richard Holdredge / holdrere@lavc.edu
Pasadena City College / Los Angeles Digital Media Center	Laurie Burruss / cosmodog@pacbel.net
North Orange County CCD / Digital Media Center	Christie Campbell / ccampbel@sce.cc.ca.us
San Diego CCD / North City New Media Center	Cynthia Scott / cscott@sdccd.edu

Appendix H: Contact List of College Survey Respondents

The following individuals responded to the 2008 Survey of Existing/Planned Game Development Programs at Regional Colleges.

COLLEGE	CONTACT NAME	EMAIL ADDRESS
Cabrillo	Ed Parrish	edparris@cabrillo.edu
Canada	Daniela Castillo	castillod@smccd.edu
Canyons	Jeffrey Baker	jeffrey.baker@canyons.edu
De Anza	Martin McNamara	mmcnamara@fhda.edu
East Los Angeles	Chris Moreno	morenoc@elac.edu
Mt. San Antonio	Don Sciore	dsciore@mtsac.edu
Ohlone	Pilar Lewis	plewis@ohlone.edu
Pasadena	Laurie Burruss	cosmodog@pacbell.net
Riverside CCD	Matt Fast	matt.fast@rcc.edu
San Diego CCD	Cynthia Scott	cscott@sdccd.edu
San Francisco	Beth Cataldo	bcataldo@ccsf.edu
Santa Ana	Patricia Waterman	waterman_patricia@sac.edu
Santa Barbara	Jim Kiggins	kiggins@sbcc.edu
Santa Monica	David Javelosa	javelosa_david@smc.edu
Santa Rosa Jr.	Mike Starkey	mstarkey@santarosa.edu

Appendix I: Summary of College Survey Responses

Colleges Offering Game Development Courses within IGDA Core Topic Areas

Survey Question #1: Fill in the following table with the courses and programs in Game Development you currently offer next to the following core topic areas. List the name of the courses, the enrollment capacity, certificates or programs, and the estimated number of times courses will be offered. NOTE: Core topic areas have been adapted from the International Game Developers Association (IGDA) Framework. The 2008 Framework is available at www.igda.org/education.

A report of the detailed responses from the survey, *Survey of Game Development Programs*, is available at the Center of Excellence website at www.coecc.net and the MEI website at <http://cccmei.net/gamestudies>.

COLLEGE	CORE TOPIC AREAS							
	Intro to Electronic/Video Games	Game Design	Game Programming	Visual Design	Audio Design	Interactive Storytelling	Game Production	Business of Gaming
	Courses/Certificates/Programs Related to Each Core Topic Area							
Cabrillo			X C					
Canada				X C D	X C D	X C D		
Canyons			X C	X C D		X C D	X C D	
De Anza	X C D	X C D	X C D	X C D	X C D	X C D	X C D	X C D
East Los Angeles				X C D				
Mt. San Antonio	X C							
Ohlone	X C	X C	X C	X C	X C D	X	X C	
Pasadena	X C	X C	X C	X C		X C		
Riverside CCD	X	X		X C D				
San Diego CCD				X	X	X	X	X
San Francisco	X C	X C	X C	X C		X C	X C	
Santa Ana				X C	X C			
Santa Barbara	X C D		X D	X C D	X C D	X C D	X C D	
Santa Monica	X C	X C	X C	X C	X C	X C	X C	X C
Santa Rosa Jr.								

X = Courses **C = Certificate Program(s)** **D = Degree Program(s)**

Courses Offered by Colleges that Prepare for Game Development Occupations

Survey Question #2: Next, fill in the following table with courses, certificates and degree programs you offer that prepare students for the eight occupations listed.

COLLEGE	GAME DEVELOPMENT OCCUPATIONS							
	Programmers/ Software Engineer	Character 2D Animator	Quality Assurance Technician/ Tester	Production Assistant	3D Modelers/ Animator	Technical Artists/ Graphic Designer	Web Programmers/ Developer	Writers/ Content Developer
	Courses/Certificates/Programs Related to Each Occupation							
Cabrillo	X C D	X C			X	X C D	X C	
Canada		X C D		X D	X C D	X C D	X C D	
Canyons	X C	X C			X C D			X C D
De Anza	X C D	X C D	X C D	X C D	X C D	X C D	X C D	X C D
East Los Angeles		X C D			X C D	X C D	X C D	
Mt. San Antonio		X C D		X C D	X C D	X C D		X C
Ohlone		X			X C	X	X	
Pasadena	X C	X C	X C	X C	X C	X C	X C	X
Riverside CCD		X C D	X C D		X C D	X C D		X
San Diego CCD	X	X			X	X	X C	X
San Francisco	X C	X C		X C	X C	X C	X C	
Santa Ana	X C D			X C D	X C	X C		X
Santa Barbara	X C D	X C D	X C D	X C D	X C D	X C D	X C D	X
Santa Monica	X C D	X C D	X C D	X C D	X C D	X C D	X C D	
Santa Rosa Jr.	X	X			X			

X = Courses **C = Certificate Program(s)** **D = Degree Program(s)**

Note: Technical Artists and Graphic Designers may include Environmental Artists, Level Designers, and Interface Designers.

Appendix K: Survey Methodology

Survey Methodology

The table below outlines the methodology utilized for this project. A total of 105 video gaming companies within California completed either a telephone or Internet survey, representing a total universe of 681 companies with both direct and indirect ties to the video gaming industry. Two versions of the survey were created. The first was designed specifically for companies within the video gaming industry (Database 1). The second survey was slightly broader and was designed to apply to all companies tied to the industry or that hired employees with similar titles and skill sets as employees in video gaming firms.

Seventy-three employers completed Survey 1 and 32 companies completed Survey 2. At the conclusion of data collection, the firms that completed Survey 2 were examined and 21 of them were reclassified into Database 1 as video gaming firms.

Methodology

Technique	Telephone and Internet survey of video gaming companies and companies that provide services to the industry or hire employees with the same skill sets as video gaming firms
Universe	415 Video game companies (Database 1: Proprietary database developed by BW Research) 265 Companies that provide services to the game industry or hire employees with the same skills (Database 2: Firms compiled based on NAICS codes related to the industry)
Number of Respondents	94 Video game companies (after the reclassification) 11 Companies that provide services to the game industry or hire employees with similar titles and skill sets as the gaming firms
Field Dates	May 13 to July 2, 2008

Questionnaire Design

Through an iterative process, BW Research worked closely with the Centers of Excellence Directors and the Multimedia & Entertainment Initiative to develop the questionnaire for the study.

Randomization of Questions

To avoid the problem of systematic position bias - where the order in which a series of questions is asked systematically influences the answers to some of the questions - several of the questions in this survey were randomized such that respondents were not consistently asked the questions in the same order. The series of items relating to technologies and applications, industry workforce issues, areas of expertise in hiring, and interest in training and education programs (Question 6, 7, 8, and 15) were randomized to avoid the systematic position bias.

Appendix L: Community College Survey Questionnaire



Survey of Existing/Planned Game Development Programs at Regional Colleges

The Bay Area, South Central and Los Angeles regional Centers of Excellence (COE) in collaboration with the Multimedia and Entertainment Initiative (MEI) are conducting a workforce study of trends in the Game Development industry. A valuable component of this study is an assessment of how community colleges are currently responding to the industry's training and workforce needs. You have been identified as someone with either a current game development program at your college, or an interest in perhaps starting one. Therefore, your input is valuable to this study.

Please take a few minutes to complete the following survey questions (approximately 15 minutes of your time) and email your responses to me at avakianj@cccwd.net.

The results of this questionnaire will be compiled and included in the Centers of Excellence/MEI report on Game Trends, and will be available as a resource for college faculty who have an interest in this subject/program area.

THANK YOU!

1. Fill in the following table with the courses and programs in Game Development you currently offer next to the following eight core topic areas. List the name of the courses, the enrollment capacity, certificates or programs, and the estimated number of times courses will be offered. NOTE: Core topic areas have been adapted from the International Game Developers Association (IGDA) Framework. The 2008 Framework is available at www.igda.org/education.

Core Topic Areas	Course Names that Relate to Topic Area (list all that apply)	Enrollment Capacity for Each Course	Certificates or Programs that Relate to Topic Area	How often will these courses/ programs be offered by June 2009?
Intro to Electronic/Video Games	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Game Design	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Game Programming	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Visual Design	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Audio Design	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Interactive Storytelling	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Game Production	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Business of Gaming	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.

2. Next, fill in the following table with courses, certificates and degree programs you offer that prepare students for the eight occupations listed.

Occupations	Courses That Prepare Students For Occupation (list all that apply)	Certificates That Prepare Students for Occupation	Degree Programs That Prepare Students for Occupation
Entry-Level Programmers or Software Engineers	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Character or 2D Animators (includes Flash Animator)	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Quality Assurance Technicians or Testers	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Production Assistants	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
3D Modelers and Animators	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Technical Artists and Graphic Designers (may include Environmental Artists, Level Designers, and Interface Designers)	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Interactive Web Programmers or Developers	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Writers & Content Developers	1. 2.	1. 2.	1. 2.

3. What future course or programs in electronic games, serious games, simulations, or virtual environments are you planning?
4. When are you planning to offer them? (Please give an estimated start date for each course that is planned.)
5. Are you having difficulty finding qualified faculty to teach your current courses? If yes, please list which courses.
6. Do you offer internships and/or work experience programs? If yes, please identify the businesses/organizations with which you work.
7. Do you provide programs or activities related to the Game Industry to local high schools? If yes, what specific programs or activities do you offer and with what schools?
8. Do you currently have industry and/or employer partnerships that support these courses/programs? If yes, what is the nature of the partnership, and please name the employer associations or organizations.
9. Do you provide customized training to employees at local companies through contract education? If yes, what employers do you provide training to, and in what content or topic area?
10. What is the status and composition of your Advisory Board?
11. Is there anything else you would like the community colleges to know about your Program?

CONTACT INFORMATION (Please)

Name: _____

Title: _____

College: _____

Daytime Phone: _____

THANK YOU!