



# Program Endorsement Brief

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ELECTRONIC GAME DESIGN IN THE GREATER SACRAMENTO  
REGION

North/Far North Center of Excellence  
FEBRUARY 2021

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**COVID-19 Statement:** This report includes employment projection data by EMSI. EMSI’s projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.

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## Summary

The North/Far North Center of Excellence for Labor Market Research prepared this report to provide regional labor market supply and demand data related to video game design and technology occupations in the North (Greater Sacramento) subregion. This report is intended to help determine whether there is demand in the local labor market that is not being met by the supply from existing community college programs.

Key findings include:

- The North (Greater Sacramento) region held 10,544 jobs for video game design and technology in 2019. Jobs for these occupations are projected to increase by 7.5% over the next five years, adding nearly 800 new jobs to the subregion.
- Over the next five years, occupations related to video game design are projected to have 1,088 annual openings in the North (Greater Sacramento) region. Nearly three-quarters of the projected openings are for software developers.
- Wages for the studied occupations are typically above the North (Greater Sacramento) region's living wage of \$13.18 per hour. However, there is an exception. The entry-level wage for special effect artists and animators is \$5 below the subregion's living wage of \$13.18 per hour. The lower reported wages may be due to higher levels of self-employment among the occupation.
- Between 11% and 26% of incumbent workers in the selected occupations have education levels consistent with community college offerings (some college or associate degrees). A majority of workers in the studied occupations have at least a bachelor's degree.
- Analysis of job postings data shows that most job postings for these occupations were in industries and with employers outside of video game design. Insurance carriers, such as Travelers, Anthem Blue Cross, and Blue Cross Blue Shield, held the largest share of job postings (4%), followed by management and consulting firms (2%) and computer system design companies (such as Intel, 2%).
- Analysis of postsecondary awards in the North (Greater Sacramento) region shows that, on average, 761 awards (certificates, associate degrees, and bachelor degrees) were issued each year between the 2016-2017 and 2018-2019 academic years across seven occupation-related training programs.

## Introduction

The North/Far North Center of Excellence was asked to provide labor market information for a proposed program at a regional community college. This report focuses on the following Standard Occupational Classification (SOC) occupations and codes:

- Computer Programmers (15-1251)
- Software Developers (15-1252)
- Special Effects Artists and Animators (27-1014)
- Web Developers and Digital Interface Designers (15-1255)
  - This occupational group includes Video Game Designers (15-1255.01)

A review of related programs revealed the following program(s) and Taxonomy of Programs (TOP) code(s) are appropriate for inclusion in this report:

- Animation (0614.40)
- Computer Graphics and Digital Imagery (0614.60)
- Computer Programming (0707.10)
- Computer Science - Transfer program (0706.00)
- Digital Media (0614.00)
- Electronic Game Design (0614.20)

The corresponding Classification of Instructional Programs (CIP) code(s) are:

- Animation, Interactive Technology, Video Graphics and Special Effects (10.0304)
- Computer Graphics (11.0803)
- Computer Programming/Programmer, General (11.0201)
- Computer Science (11.0701)
- Prepress/Desktop Publishing and Digital Imaging Design (10.0303)
- Game and Interactive Media Design - 50.0411

The SOC titles, SOC codes, and job descriptions from the Bureau of Labor Statistics (BLS) and O\*Net OnLine are shown below.

### **Computer Programmers (15-1251)**

Create, modify, and test the code and scripts that allow computer applications to run. Work from specifications drawn up by software and web developers or other individuals. May develop and write computer programs to store, locate, and retrieve specific documents, data, and information.

**Software Developers (15-1252)**

Research, design, and develop computer and network software or specialized utility programs. Analyze user needs and develop software solutions, applying computer science, engineering, and mathematical analysis principles and techniques. Update software or enhance existing software capabilities. May work with computer hardware engineers to integrate hardware and software systems and develop specifications and performance requirements. May maintain databases within an application area, work individually, or coordinate database development as part of a team.

**Special Effects Artists and Animators (27-1014)**

Create special effects or animations using film, video, computers, or other electronic tools and media for use in products, such as computer games, movies, music videos, and commercials.

**Web and Digital Interface Designers (15-1255)**

Design digital user interfaces or websites. Develop and test layouts, interfaces, functionality, and navigation menus to ensure compatibility and usability across browsers or devices. May use web framework applications as well as client-side code and processes. May evaluate web design following web and accessibility standards and analyze web use metrics and optimize websites for marketability and search engine ranking. May design and test interfaces that facilitate the human-computer interaction and maximize the usability of digital devices, websites, and software with a focus on aesthetics and design. May create graphics used in websites and manage website content and links.

**Video Game Designers (15-1255.01)**

Design core features of video games. Specify innovative game and role-play mechanics, storylines, and character biographies. Create and maintain design documentation. Guide and collaborate with production staff to produce games as designed.

## Occupational Demand

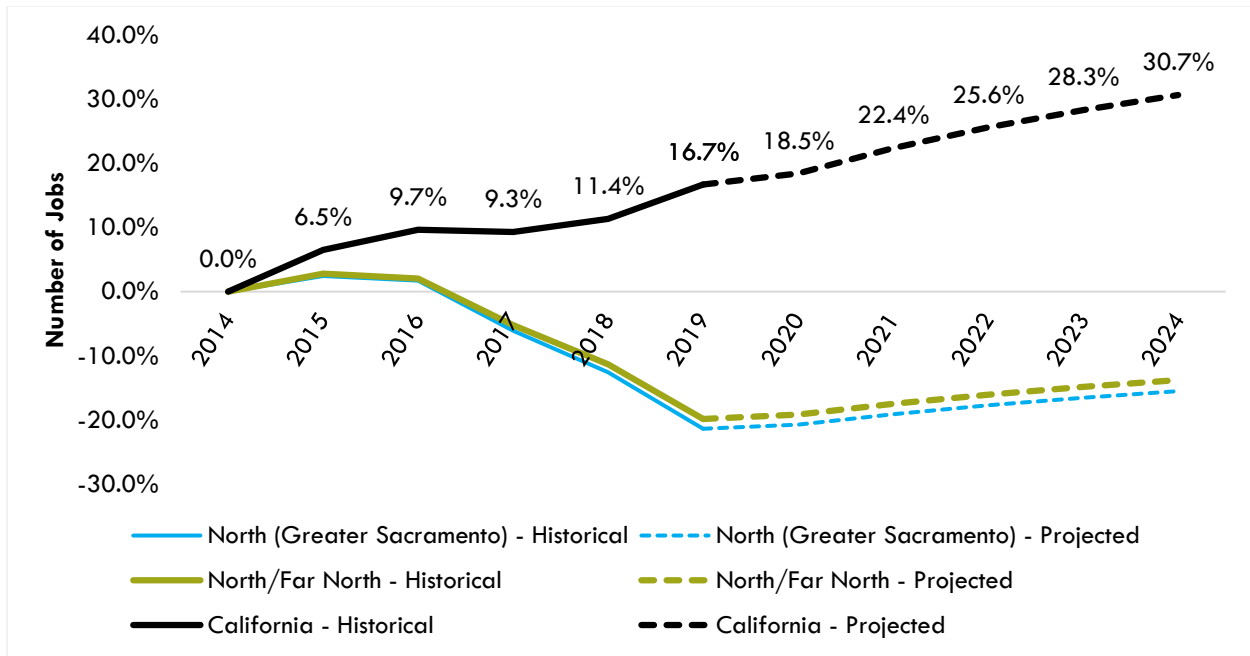
Exhibit 1 summarizes the five-year projected job growth for the North (Greater Sacramento) selected occupations, North/Far North, and California.

**Exhibit 1. Employment and projected demand, 2019-2024**

Occupation	EMSI SOC	2019 Jobs	2024 Jobs	2019-2024 Jobs Change	2019-2024 Jobs % Change	2019-2024 Annual Openings
Computer Programmers	15-1251	1,215	1,182	(33)	(2.7%)	142
Software Developers and Software Quality Assurance Analysts and Testers	15-1256	7,983	8,690	707	8.9%	801
Web Developers and Digital Interface Designers	15-1257	1,005	1,104	99	9.8%	99
Special Effects Artists and Animators	27-1014	341	356	15	4.4%	46
<b>North (Greater Sacramento) subregion</b>	<b>TOTAL</b>	<b>10,544</b>	<b>11,332</b>	<b>788</b>	<b>7.5%</b>	<b>1,088</b>
Computer Programmers	15-1251	1,386	1,341	(45)	(3.3%)	161
Software Developers and Software Quality Assurance Analysts and Testers	15-1256	8,546	9,344	798	9.3%	876
Web Developers and Digital Interface Designers	15-1257	1,228	1,340	112	9.1%	123
Special Effects Artists and Animators	27-1014	438	454	15	3.5%	61
<b>North/Far North region</b>	<b>TOTAL</b>	<b>11,598</b>	<b>12,479</b>	<b>880</b>	<b>7.6%</b>	<b>1,220</b>
Computer Programmers	15-1251	26,767	27,066	299	1.1%	2,353
Software Developers and Software Quality Assurance Analysts and Testers	15-1256	245,499	278,787	33,288	13.6%	27,404
Web Developers and Digital Interface Designers	15-1257	27,285	30,470	3,185	11.7%	2,809
Special Effects Artists and Animators	27-1014	15,632	16,588	956	6.1%	2,099
<b>California</b>	<b>TOTAL</b>	<b>315,182</b>	<b>352,910</b>	<b>37,729</b>	<b>12.0%</b>	<b>34,665</b>

Exhibit 2 compares the percent change in the number of jobs between 2014 through 2019 and the projected changes through 2024. The rate of change is indexed to the total number of jobs in 2014.

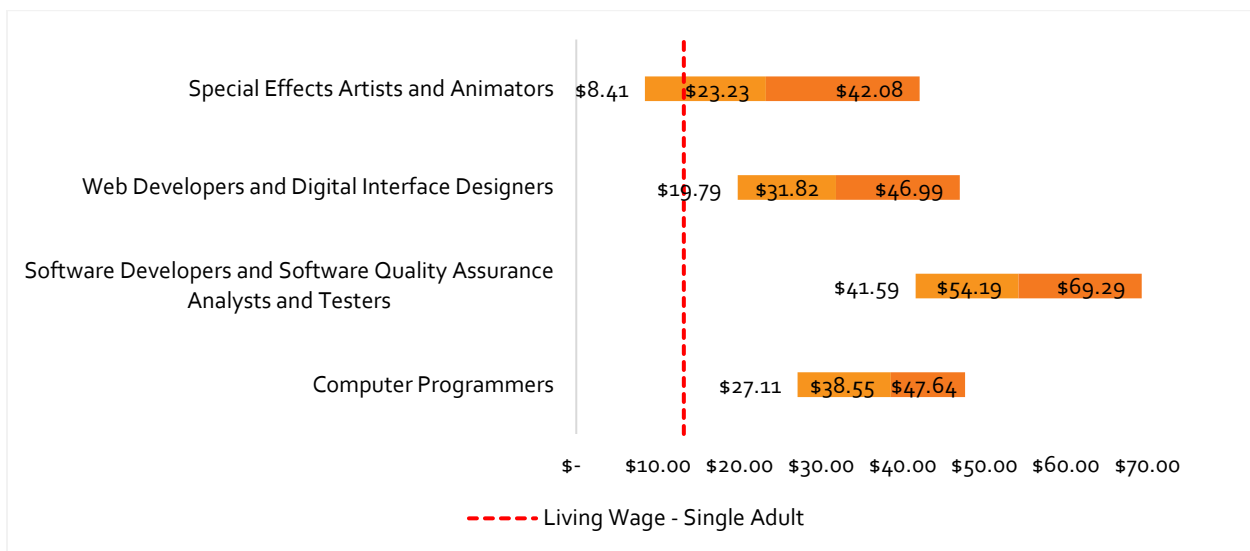
**Exhibit 2. Changes in employment, 2014-2024**



## Wages

Exhibit 3 compares the entry-level, median, and experienced wages for the selected occupations to the North (Greater Sacramento) living wage for a single adult - \$13.18 per hour.<sup>1</sup>

**Exhibit 3. Comparison of wages by occupation, North (Greater Sacramento) region**



<sup>1</sup> Living wage is defined as the level of income a single adult with no children must earn to meet basic needs, including food, housing, transportation, healthcare, taxes, and other miscellaneous basic needs. The 25th-percentile and 75th-percentile hourly wages are used as proxy for entry-level and experienced-level wages.

## Job Postings

This section of the report analyzes recent data from online job postings (real-time LMI). Online job postings may provide additional insight into recent changes in the labor market that are not captured by historical data. Job postings data comes from Burning Glass Labor Insights and represents new listings posted online within the last year, from February 1, 2020, to January 31, 2021.

### Occupations and Job Titles

Exhibit 4 details the number of online job postings for the selected occupations. Burning Glass identified a pool of 7,025 job postings for the selected occupations in the North (Greater Sacramento) region.

#### Exhibit 4. Number of job postings by occupation

SOC Code	Occupation	Job Postings	Share of Job Postings
15-1252.00	Software Developers	6,328	90%
15-1251.00	Computer Programmers	559	8%
15-1255.01	Video Game Designers	105	1.5%
27-1014.00	Special Effects Artists and Animators	33	0.5%
	Total Job Postings	7,025	100%

Exhibit 6 shows the top 10 job titles with the most job postings and the share of job postings. All 7,025 job postings included a job title.

#### Exhibit 6. Top jobs titles for selected occupations in the North (Greater Sacramento) region

Job Title	Job Postings	Share of Job Postings
Software Engineer	296	4%
Senior Software Engineer	219	3%
DevOps Engineer	171	2%
C E A	147	2%
Full-Stack Software Engineer	139	2%
Java Developer	132	2%
.Net Developer	132	2%
Software Developer	78	1%
Senior Java Developer	62	1%
Senior Net Developer	50	1%



## Employers

Exhibit 7 shows the top 10 employers for job postings related to the selected occupations.

### Exhibit 7. Top employers for selected occupations in the North (Greater Sacramento) region

Employer	Job Postings	Share of Job Postings
Travelers	90	1.3%
Centene Corporation	89	1.3%
Accenture	60	0.9%
Intel Corporation	56	0.8%
Anthem Blue Cross	55	0.8%
Blue Cross Blue Shield of California	49	0.7%
Zeektek (IT recruiter)	43	0.6%
University Of California	43	0.6%
Salesforce	40	0.6%
Deloitte	40	0.6%

Exhibit 8 shows the top industries for job postings related to the selected occupations. Please note that 72% of job postings have been excluded because they did not map to an industry. As a result, this data may not be representative of the full sample of job postings.

### Exhibit 8. Industries with the most job postings for selected occupations in North (Greater Sacramento)

Industry	Job Postings	Share of Job Postings
Insurance Carriers	298	4%
Management, Scientific, and Technical Consulting Services	172	2%
Computer Systems Design and Related Services	161	2%
Software Publishers	124	2%
Employment Services	100	1%
Colleges, Universities, and Professional Schools	95	1%
Semiconductor and Other Electronic Component Manufacturing	86	1%

Industry	Job Postings	Share of Job Postings
Depository Credit Intermediation	69	1%
National Security and International Affairs	56	1%
Aerospace Product and Parts Manufacturing	53	1%

## Skills and Certifications

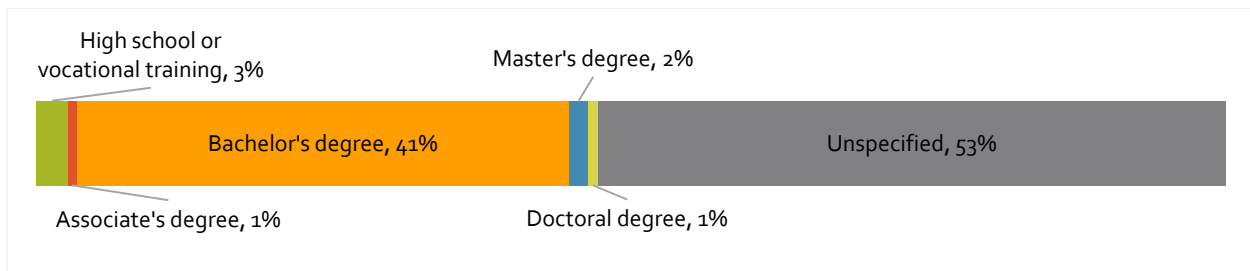
Exhibit 9 shows the top 10 specialized skills for the selected occupations.

### Exhibit 9. Top skills for selected occupations in the North (Greater Sacramento) region

Specialized Skill	Job Postings	Share of Job Postings
SQL	2,619	36%
Java	2,345	33%
Software Engineering	2,041	28%
JavaScript	2,039	28%
Software Development	1,605	22%
.NET	1,365	19%
Git	1,355	19%
Active Server Pages (ASP)	919	13%
Version Control	905	13%
Microsoft C#	901	13%

Exhibit 10 shows the minimum level of education required by employers for job postings within the selected occupations.

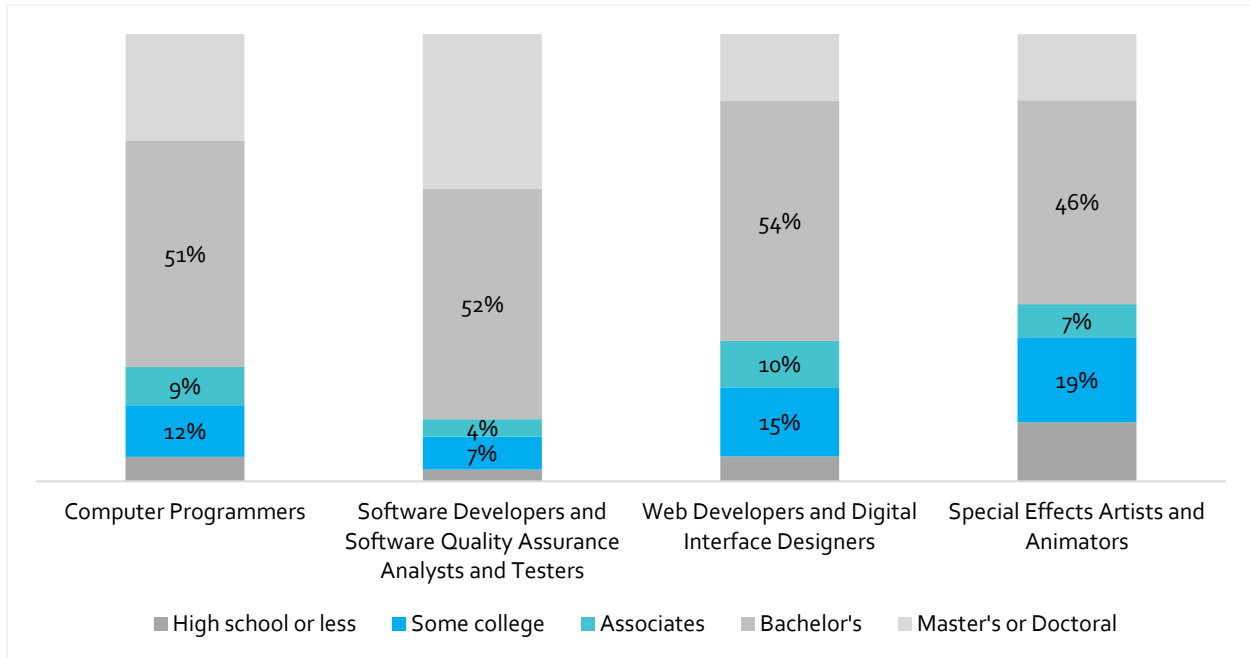
### Exhibit 10. Employer-preferred minimum education levels for selected occupations



## Education and Training Requirements

The U.S. Census Bureau and Bureau of Labor Statistics collected data on education achieved by workers employed in occupations. Exhibit 11 shows the national-level educational attainment of the current workforce in the selected occupations.

**Exhibit 11. Educational attainment for selected occupations, 2018**



The Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education, work experience in a related occupation, and typical on-the-job training to each occupation for which the BLS publishes projections data. Exhibit 12 shows the entry-level job requirements for the selected occupations.

**Exhibit 12. Typical education, training, and work experience for selected occupations**

Occupation	Typical Entry-Level Education Required	Work Experience Required	Typical On-the-job Training Required
Computer Programmers	Bachelor's degree	None	None
Software Developers and Software Quality Assurance Analysts and Testers	Bachelor's degree	None	None
Web Developers and Digital Interface Designers (incl. Video Game Designers)	Associate's degree	None	None
Special Effects Artists and Animators	Bachelor's degree	None	None

## Educational Supply

Educational supply for an occupation can be estimated by analyzing the number of awards issued in related Taxonomy of Programs (TOP) or Classification of Instructional Programs (CIP) codes. Exhibit 13 shows the TOP and CIP codes related to the selected occupations.

**Exhibit 13. Related TOP and CIP programs and codes for the selected occupations**

TOP Programs and Codes	Aligned CIP Programs and Codes
Animation - 0614.40	Animation, Interactive Technology, Video Graphics, and Special Effects - 10.0304
Computer Graphics and Digital Imagery - 0614.60	Computer Graphics - 11.0803
Computer Programming - 0707.10	Computer Programming/Programmer, General - 11.0201
Computer Science (Transfer) - 0706.00	Computer Science - 11.0701
Computer Software Development - 0707.00	Computer Programming/Programmer, General - 11.0201
Digital Media - 0614.00	Prepress/Desktop Publishing and Digital Imaging Design - 10.0303
Electronic Game Design - 0614.20	Animation, Interactive Technology, Video Graphics, and Special Effects - 10.0304 Game and Interactive Media Design - 50.0411

## Community College Supply

Exhibit 14 compares the average number of certificates and degrees conferred by North (Greater Sacramento) region community colleges in the selected programs over the last three academic years.

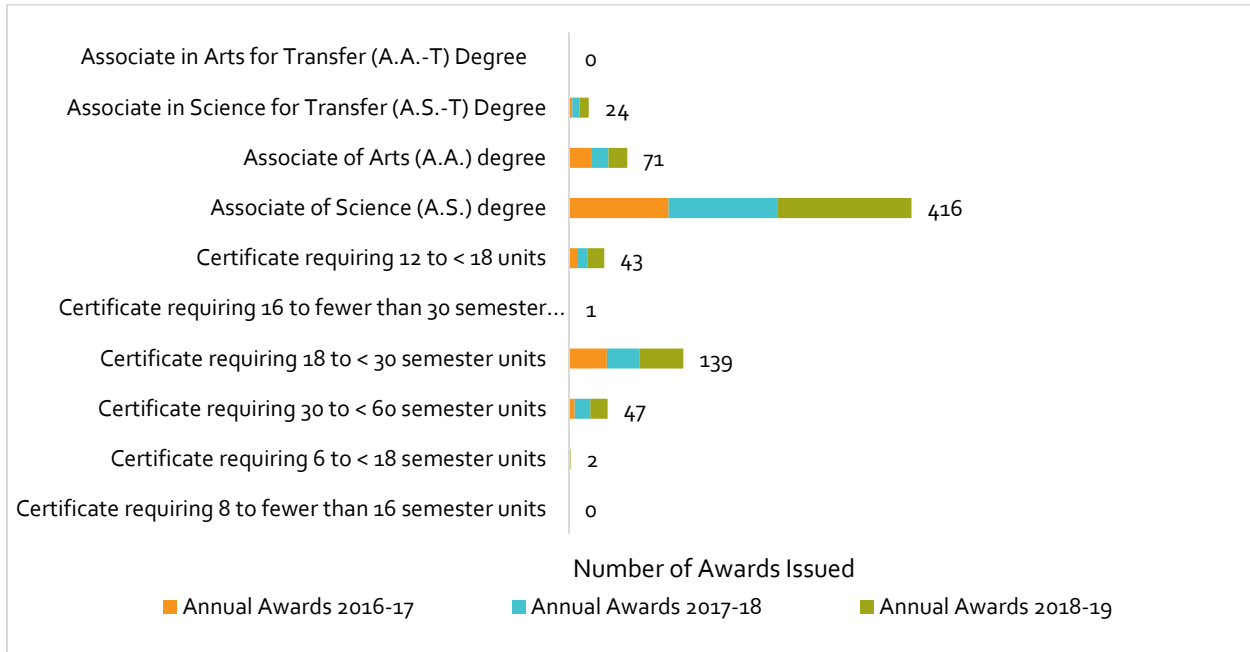
**Exhibit 14. Regional community college awards (certificates and degrees), 2016-17 through 2018-19**

Program	College	Annual Awards 2016-2017	Annual Awards 2017-2018	Annual Awards 2018-2019	3-Year Annual Awards Average
Animation (0614.40)	American River	14	8	6	10
	Sacramento City			12	12
	<b>Subtotals</b>	<b>14</b>	<b>8</b>	<b>18</b>	<b>22</b>
Computer Graphics and Digital Imagery (0614.60)	American River	1	1	2	1
	<b>Subtotals</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>
Computer Programming (0707.10)	American River	34	25	42	34
	Cosumnes River	5	23	9	12

Program	College	Annual Awards 2016-2017	Annual Awards 2017-2018	Annual Awards 2018-2019	3-Year Annual Awards Average
	Folsom Lake	6	5	16	9
	Sacramento City	10	12	10	11
	Sierra	21	23	35	27
	Yuba	6	5	15	9
	<b>Subtotals</b>	<b>82</b>	<b>93</b>	<b>127</b>	<b>103</b>
Computer Science - Transfer (0706.00)	American River	24	22	29	25
	Cosumnes River	6	16	7	10
	Folsom Lake	13	18	28	20
	Sierra	4	9	11	8
	<b>Subtotals</b>	<b>47</b>	<b>65</b>	<b>75</b>	<b>62</b>
Computer Software Development (0707.00)	Cosumnes River	1		1	1
	Sacramento City	9	19	13	15
	<b>Subtotals</b>	<b>10</b>	<b>19</b>	<b>14</b>	<b>16</b>
Digital Media (0614.00)	American River	20	22	28	25
	Sacramento City	43	25	21	35
	<b>Subtotals</b>	<b>63</b>	<b>47</b>	<b>49</b>	<b>60</b>
Electronic Game Design (0614.20)	Sacramento City	--	--	8	8
	<b>Subtotals</b>	<b>--</b>	<b>--</b>	<b>8</b>	<b>8</b>
<b>Grand Totals</b>		<b>217</b>	<b>233</b>	<b>293</b>	<b>272</b>

Exhibit 15 shows the distribution of issued awards by type.

**Exhibit 15. Regional community college awards by type, 2016-17 through 2018-19**



### Other Postsecondary Supply

It is crucial to consider the supply from non-community college institutions in the region that provides training for the selected occupations. As video game occupations typically require a bachelor's degree for entry-level work, supply includes all four-year educational institutions that issue degrees in related programs.

Three bachelor-degree granting institutions in the subregion offer training in a related program - computer science - CSU Sacramento, UC Davis, and William Jessup University (Exhibit 16).

**Exhibit 16. Regional bachelor degree awards, 2016-17 through 2018-19**

Program	College	Annual Awards 2016-2017	Annual Awards 2017-2018	Annual Awards 2018-2019	3-Year Annual Awards Average
Computer Science (11.0701)	UC Davis	294	326	301	307
	CSU Sacramento	143	156	236	178
	William Jessup University	--	--	4	4
<b>Grand Totals</b>		<b>437</b>	<b>487</b>	<b>541</b>	<b>489</b>

## Findings

- The North (Greater Sacramento) region held 10,544 jobs for video game design occupations in 2019. Seventy-six percent of these jobs were held by software developers (SOC 15-1256), while less than 20% of jobs were for special effects artists and animators (SOC 27-1014) and web and digital interface designers (SOC 15-1255) (including video game designers (SOC 15-1255.01)).
- Jobs for these occupations are projected to increase by 7.5% over the next five years, adding nearly 800 new jobs to the subregion.
- Over the next five years, occupations related to video game design are projected to have 1,088 annual openings in the North (Greater Sacramento) region. Nearly three-quarters of the projected openings are for software developers.
- Wage data shows that most of these occupations earn \$7 to \$28 above the subregion's living wage of \$13.18 per hour. Entry-level wages for web developers, software developers, and computer programmers range from \$20 to \$41 per hour.
- Entry-level wages for special effects artists and animators are nearly \$5 below the subregion's living wage of \$13.18 per hour. The lower reported wages reflect higher levels of self-employment among special effects artists and animators. In 2019, 239 of the 341 jobs for special effect artists and animators were identified as self-employed.<sup>2</sup>
- According to real-time labor market information, there were 7,025 online job postings for the studied occupations between February 1, 2020, and January 31, 2021. Ninety percent of online job postings in the North (Greater Sacramento) subregion were software developers, while less than 2% were for video game designers.
- A smaller share of online job postings is directly related to jobs at video game design firms. Employers with the most job postings, such as Travelers, Centene, Accenture, and Intel, represent insurance, consulting, and computer system design industries. Electronic Arts, Inc., a well-known game design company with an establishment in downtown Sacramento, had only eight job postings for video game designers in the last 12 months.<sup>3</sup>
- While half of the job postings did not specify a minimum educational level, only 4% of job postings required an education level consistent with community college offerings. Forty-three percent of job postings had employers that requested a minimum of a bachelor's degree.
- Between 11% and 26% of incumbent workers in the selected occupations have education levels consistent with community college offerings (some college or associate degrees). A majority of workers in the studied occupations have at least a bachelor's degree.
- Analysis of postsecondary awards in the North (Greater Sacramento) region shows that, on average, 761 awards (certificates, associate degrees, and bachelor degrees) were issued each year between the 2016-2017 and 2018-2019 academic years across seven occupation-related training programs.

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<sup>2</sup> EMSI 2020.4; QCEW, Non-QCEW; and Self-Employed.

<sup>3</sup> Burning Glass Labor Insights, Accessed February 26, 2021. Note: Electronic Arts was no. 82 with 10 job postings (eight of which were for video game designers) on the list of employers with the most job postings.

## Recommendations

- Demand for occupational training specifically related to video game design pales compared to the need for workers with similar skill sets that can be applied in a broader context. Greater Sacramento employers are looking for workers with technology-specific skills (such as software and database management) that can work in various settings and across different industries.
- North community colleges looking to implement new electronic game design programs should consider training students for a broader set of technology-oriented skills (such as software engineering, software development, and programming). Doing so may enable students to find well-paying jobs with employers outside of video game development.
- Also, the educational attainment of existing workers (a majority hold bachelor degrees and beyond) and the educational requirements for entry-level work (predominantly bachelor degrees) suggest that community colleges should offer training in a transfer-oriented pathway. This is further supported by job postings data, which indicates a subregional employer-preference for workers in these occupations to have a four-year degree.
- Based on a three-year average of annual awards in related North (Greater Sacramento) region programs (761 certificates and degrees) and projected yearly openings (1,088 openings), the region seems to have room for new training programs related to these occupations.
- The North/Far North Center of Excellence recommends proceeding with caution.

COE Recommendation		
Move forward with the program	Proceed with caution	Program is not recommended
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



## Appendix A. Methodology and Sources

Occupations in this report were identified using O\*Net. This report's findings were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi, and jobs posting data from Burning Glass.

Sources used for data analysis purposes in this report include:

Cal-PASS Plus LaunchBoard. California Community Colleges Chancellor's Office.  
<https://www.calpassplus.org/LaunchBoard/Home.aspx>.

Emsi. <https://www.economicmodeling.com/>. EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors).

Educational Attainment for Workers 25 Years and Older by Detailed Occupation, 2016-2017. Bureau of Labor Statistics. <https://www.bls.gov/emp/tables/educational-attainment.htm#>.

Integrated Postsecondary Education Data System (IPEDS). National Center for Education Statistics. U.S. Department of Education. <https://nces.ed.gov/ipeds/>.

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Management Information Systems (MIS) Data Mart. California Community Colleges Chancellor's Office.  
<https://datamart.cccco.edu/>.

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O\*NET OnLine. U.S. Department of Labor/Employment and Training Administration (DOL ETA).  
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Self-Sufficiency Standard Tool for California. The University of Washington.  
<http://www.selfsufficiencystandard.org/>

"Taxonomy of Programs." California Community Colleges Chancellor's Office. June 2012, 6<sup>th</sup> Edition.  
<https://www.cccco.edu/-/media/CCCCO-Website/About-Us/Divisions/Educational-Services-and-Support/Academic-Affairs/What-we-do/Curriculum-and-Instruction-Unit/Files/TOPmanual6200909corrected12513pdf.ashx>.

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