

Summary

Program LMI Endorsement	Endorsed: All LMI Criteria Met <input type="checkbox"/>	Endorsed: Some LMI Criteria Met <input checked="" type="checkbox"/>	Not LMI Endorsed <input type="checkbox"/>
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Program LMI Endorsement Criteria

	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Supply Gap:		<p><i>Comments:</i> There is projected to be 1,219 annual job openings throughout Los Angeles and Orange counties for these middle skill immersive media and emerging technologies occupations, which is less than the 4,296 awards conferred by educational institutions. However, the related educational programs train for an additional 14 occupations that account for over 18,500 annual job openings. Therefore, supply is overstated for these immersive media and emerging technologies occupations.</p>
Living Wage: (Entry-Level, 25 th)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		<p><i>Comments:</i> All annual job openings for these middle skill immersive media and emerging technologies occupations have entry-level hourly wages above the OC living wage of \$20.63.</p>
Education:	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		<p><i>Comments:</i> Though these middle skill immersive media and emerging technologies occupations typically require a bachelor's degree, a significant percentage of workers in the field have completed some college or an associate degree as their highest level of education.</p>

Emerging Occupation(s)

	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
		<p><i>Comments:</i> Currently, there is no Standard Occupational Classification (SOC) code within the federal Bureau of Labor Statistics (BLS) system specifically for immersive and emerging technologies such as Augmented Reality (AR), Extended Reality (ER), Mixed Reality (MR), and Virtual reality (VR). According to McKinsey, these forms of immersive reality are being utilized for learning and assessment, product design and development, enhanced situational awareness, gaming and live events, and more.¹ The skills required to design and build these immersive realities have been absorbed into existing occupations related to app and web development, animation, and graphic design. The four occupations analyzed in this report are most closely related to immersive media and the related emerging technologies.</p>

The Orange County Center of Excellence for Labor Market Research (OC COE) prepared this report to determine whether there is a supply gap in the Los Angeles/Orange County regional labor market related to four immersive media and emerging technologies occupations:

¹ <https://www.mckinsey.com/spContent/bespoke/tech-trends/pdfs/mckinsey-tech-trends-outlook-2022-immersive-reality.pdf>

- Middle-Skill
 - Web Developers (15-1254)
 - Web and Digital Interface Designers (15-1255)
- Above Middle-Skill – denoted with an asterisk (*) throughout this report.
 - Special Effects Artists and Animators (27-1014)*
 - Graphic Designers (27-1024)*

Middle-skill occupations typically require a community college education while above middle-skill occupations typically require at least a bachelor’s degree.

Based on the available data, there appears to be an oversupply for middle skill immersive media and emerging technologies occupations in the region. However, supply is overstated because the related educational programs that train for these immersive media and emerging technologies occupations also train for 14 other occupations not included in this report. Additionally, typical entry-level wages for these middle skill immersive media and emerging technologies occupations are above the living wage and typical education requirements align with a community college education. Therefore, **due to some of the regional labor market criteria being met, the COE endorses this proposed program.**

Exhibit 1 lists the occupational demand, supply, typical entry-level education, and educational attainment for the occupations included in this report.

Exhibit 1: Labor Market Endorsement Summary

Occupation (SOC)	Demand (Annual Openings)	Supply (CC and Non-CC)	Entry-Level Hourly Earnings (25 th Percentile)	Typical Entry-Level Education	Community College Educational Attainment
Web Developers (15-1254)	LA: 299	<i>Accounted for Below</i>	OC: \$23.61	Bachelor's degree	25%
	OC: 112				
	TTL: 411				
Web and Digital Interface Designers (15-1255)	LA: 604	LA: 2,808	OC: \$25.00	Bachelor's degree	25%
	OC: 204	OC: 1,488			
	TTL: 808	TTL: 4,296			
Middle-Skill Total	1,219	4,581	N/A	N/A	N/A
Special Effects Artists and Animators (27-1014)*	LA: 2,029	LA: 1,045	OC: \$27.47	Bachelor's degree	27%
	OC: 128	OC: 379			
	TTL: 2,157	TTL: 1,424			
Graphic Designers (27-1024)*	LA: 1,594	LA: 352	OC: \$21.10	Bachelor's degree	26%
	OC: 448	OC: 52			
	TTL: 2,042	TTL: 404			
Above Middle-Skill Total	4,199	1,828	N/A	N/A	N/A
Total	5,418	6,409	N/A	N/A	N/A

*Denotes an above middle-skill occupation

Demand:

- The number of jobs related to these middle-skill immersive media and emerging technologies occupations are projected to increase 11% through 2027, equating to 1,219 annual job openings.
- Hourly entry-level wages for these middle-skill immersive media and emerging technologies occupations range from \$23.61 to \$25.00 in Orange County; all annual job openings have entry-level wages above the living wage.
- There were 5,140 online job postings for these middle-skill immersive media and emerging technologies occupations over the past 12 months. The highest number of postings were for web developers, front end developers, front end engineers, and UI/UX designers.
- The typical entry-level education for these middle-skill immersive media and emerging technologies occupations is a bachelor's degree.
- Approximately 25% of workers in these middle-skill occupations have completed some college or an associate degree as their highest level of educational attainment.

Supply:

- There was an average of 1,687 awards conferred by all 28 community colleges, plus one noncredit center, in Los Angeles and Orange Counties from 2019 to 2022. Of those, 55% (928) were for the middle-skill occupations.
- Non-community college institutions conferred an average of 4,436 awards from 2019 to 2021. Of those, 76% (3,382) were for the middle-skill occupations.
- Orange County community college students that exited digital media programs in the 2020-21 academic year had a median annual wage of \$32,614 after exiting the program and 35% attained the regional living wage.
- Throughout Orange County, 55% of digital media students that exited their program in 2019-20 reported that they are working in a job closely related to their field of study.

Demand

Occupational Projections:

Exhibit 2 shows the annual percent change in jobs for these four immersive media and emerging technologies occupations from 2017 through 2027. Though there was a 7% decline across all occupations from 2019 to 2020 due to the COVID-19 pandemic, employment in these immersive media and emerging technologies occupations increased in Orange County during the same period. Notably, employment in these immersive media and emerging technologies occupations increased 22% in Los Angeles County from 2021 to 2022. These immersive media and emerging technologies occupations are projected to grow at a similar rate compared to all occupations through 2027.

Exhibit 2: Annual Percent Change in Jobs for Immersive Media and Emerging Technologies Occupations, 2017-2027

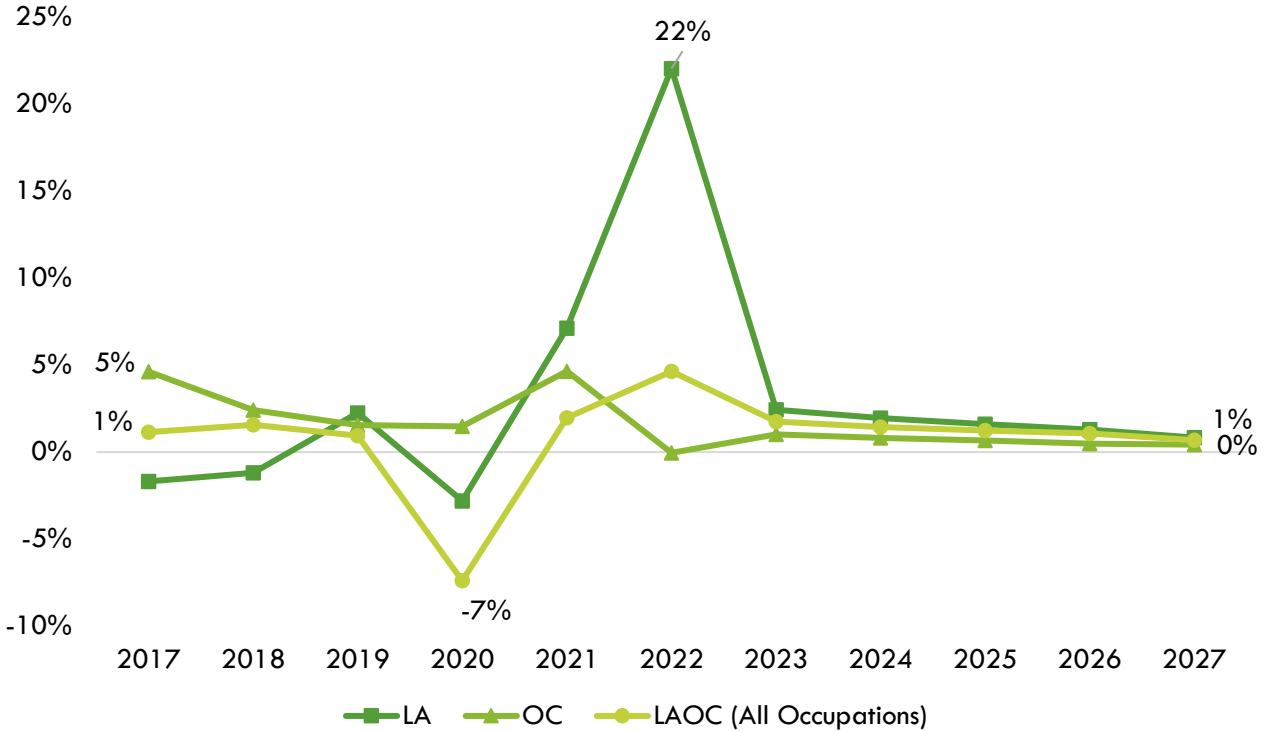


Exhibit 3 shows the five-year occupational demand projections for *web developers* and *web and digital interface designers*, the two middle-skill immersive media and emerging technologies occupations examined in this report. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 11% through 2027. There is projected to be 1,219 jobs available annually.

Exhibit 3: Middle-Skill Occupational Demand in Los Angeles and Orange Counties²

Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	8,464	9,421	957	11%	903
Orange	3,091	3,384	293	10%	316
Total	11,554	12,805	1,250	11%	1,219

Exhibit 4 shows the five-year occupational demand projections for *special effects artists and animators* and *graphic designers*, the two above middle-skill immersive media and emerging technologies occupations examined in this report. In Los Angeles/Orange County, the number of jobs related to these occupations is projected to increase by 7% through 2027. There is projected to be 4,199 jobs available annually.

² Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

Exhibit 4: Above Middle-Skill Occupational Demand in Los Angeles and Orange Counties³

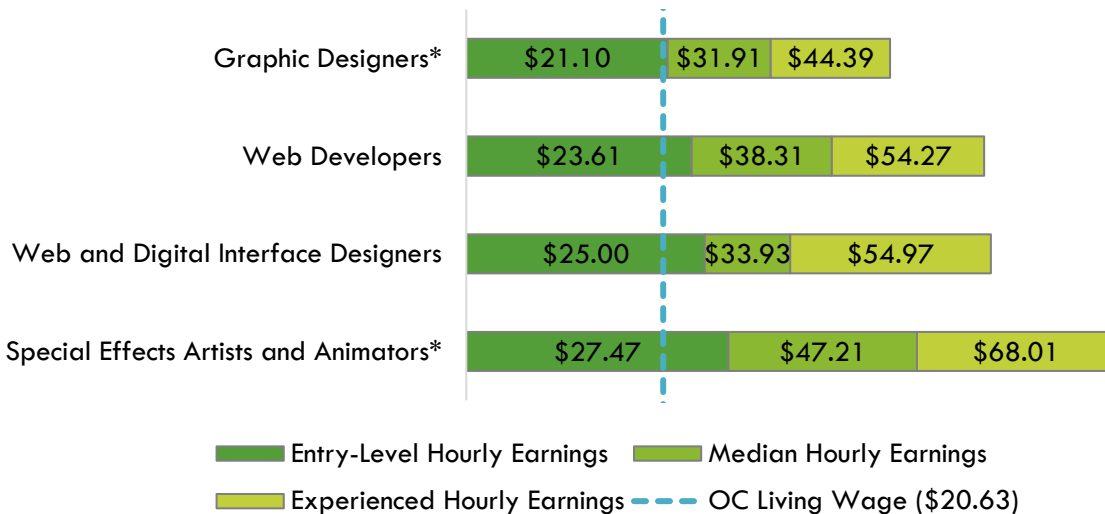
Geography	2022 Jobs	2027 Jobs	2022-2027 Change	2022-2027 % Change	Annual Openings
Los Angeles	31,170	33,536	2,366	8%	3,623
Orange	6,057	6,079	22	1%	576
Total	37,227	39,615	2,388	7%	4,199

Wages:

The labor market endorsement in this report considers the entry-level hourly wages for these immersive media and emerging technologies occupations in Orange County as they relate to the county’s living wage. Los Angeles County wages are included below in order to provide a complete analysis of the LA/OC region.

All annual openings for these middle-skill immersive media and emerging technologies occupations have entry-level wages above the living wage for one adult in Orange County (\$20.63). Typical entry-level hourly wages for these middle-skill occupations range between \$23.61 and \$25.00. Orange County’s average wages (\$43.08) are below the average statewide wage of \$55.12 for these middle-skill occupations. Exhibit 5 shows the wage range for each of these immersive media and emerging technologies occupations in Orange County and how they compare to the regional living wage, sorted from lowest to highest entry-level wage.

Exhibit 5: Wages by Occupation in Orange County

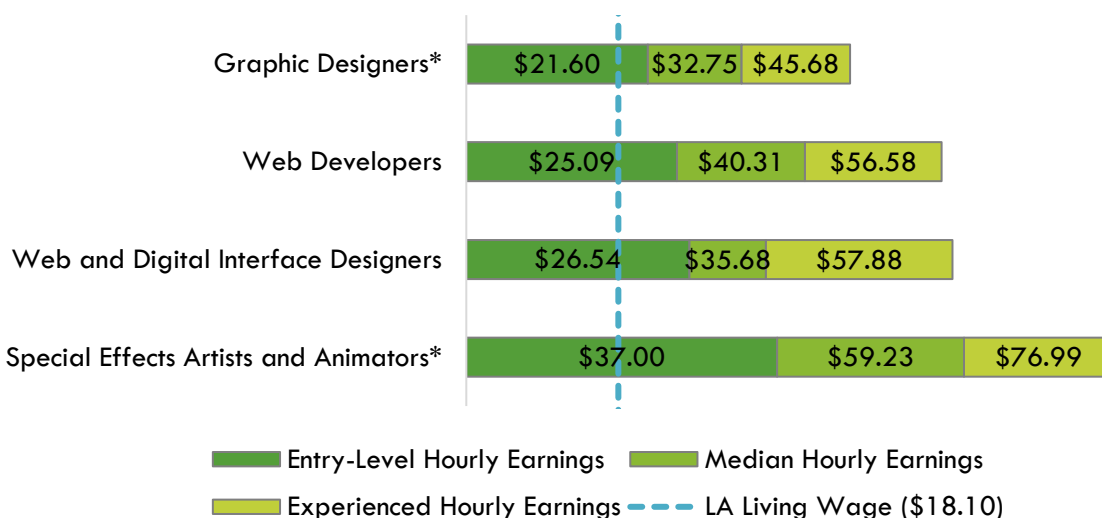


All annual openings for these middle-skill immersive media and emerging technologies occupations have entry-level wages above the living wage for one adult in Los Angeles County (\$18.10). Typical entry-level hourly wages range between \$25.09 and \$26.54 for these middle-skill occupations. Los Angeles County’s average wages (\$45.16) are below the average statewide wage of \$55.12 for these middle-skill occupations. Exhibit 6 shows the wage range for each of these immersive media and emerging

³ Five-year change represents new job additions to the workforce. Annual openings include new jobs and replacement jobs that result from retirements and separations.

technologies occupations in Los Angeles County and how they compare to the regional living wage, sorted from lowest to highest entry-level wage.

Exhibit 6: Wages by Occupation in Los Angeles County



Job Postings:

Important Online Job Postings Data Note: Online job postings data is sourced from Lightcast, a labor market analytics firm that scrapes, collects, and organizes data from online job boards such as LinkedIn, Indeed, Glassdoor, Monster, GovernmentJobs.com, and thousands more. Lightcast uses natural language processing (NLP) to determine the related company, industry, occupation, and other information for each job posting. However, NLP has limitations that include understanding contextual words or phrases; determining differences in words that can be used as nouns, verbs, and/or adjectives; and misspellings or grammatical errors.⁴ For these reasons, job postings could be assigned to the wrong employer, industry, or occupation within Lightcast’s database.

Additionally, there are several limitations when analyzing job postings. A single job posting may not represent a single job opening, as employers may be creating a pool of candidates for future openings or hiring for multiple positions with a single posting. Additionally, not all jobs are posted online, and jobs may be filled through other methods such as internal promotion, word-of-mouth advertising, physical job boards, or a variety of other channels.

There were 8,782 online job postings related to these four immersive media and emerging technologies occupations listed in the past 12 months. Of those, 59% (5,140) were for middle skill immersive media and emerging technologies occupations. Exhibit 7 shows the number of job postings by occupation.

Exhibit 7: Number of Job Postings by Occupation (n=8,782)

Occupation	Job Postings	Percentage of Job Postings
Web Developers	4,059	46%
Graphic Designers*	2,984	34%
Web and Digital Interface Designers	1,081	12%
Special Effects Artists and Animators*	658	7%
Total Postings	7,918	100%

⁴ K. R. Chowdhary, Fundamentals of Artificial Intelligence (Basingstoke: Springer Nature, 2020), <https://link.springer.com/book/10.1007/978-81-322-3972-7>.

The top employers for *web developers* and *web and digital interface designers*, the two middle-skill immersive media and emerging technologies occupations in the region, by number of job postings, are shown in Exhibit 8.

Exhibit 8: Top Middle-Skill Employers by Number of Job Postings (n=5,140)

Employer	Job Postings	Percentage of Job Postings
CyberCoders	200	4%
Motion Recruitment	179	3%
Boeing	96	2%
Canteen Vending	75	1%
Riot Games	72	1%
Electronic Arts	44	1%
Amazon	41	1%
Cox Automotive	41	1%
Ledgent	40	1%
Apple	38	1%

The top employers for the two above middle-skill immersive media and emerging technologies occupations in the region, by number of job postings, are shown in Exhibit 9.

Exhibit 9: Top Above Middle-Skill Employers by Number of Job Postings (n=3,642)

Employer	Job Postings	Percentage of Job Postings
Robert Half	48	1%
Disney	47	1%
Riot Games	35	1%
Aquent	29	1%
Canteen Vending	28	1%
23 Seven	27	1%
Electronic Arts	25	1%
NBC	24	1%
John Deere	23	1%
Creative Circle	21	1%

The top specialized, soft, and computer skills listed by those most frequently mentioned in job postings (denoted in parentheses) for the two middle occupations, *web developers* and *web and digital interface designers*, are shown in Exhibit 10.

Exhibit 10: Top Skills for Middle-Skill Occupations by Number of Job Postings (n=5,140)

Top Specialized Skills	Top Soft Skills	Top Computer Skills
JavaScript (Programming Language) (1,735)	Communications (1,490)	JavaScript (Programming Language) (1,735)
Cascading Style Sheets (CSS) (1,479)	Research (848)	Cascading Style Sheets (CSS) (1,479)
User Experience (UX) (1,355)	Problem Solving (755)	HyperText Markup Language (HTML) (1,203)

Top Specialized Skills	Top Soft Skills	Top Computer Skills
Front End (Software Engineering) (1,276)	Detail Oriented (524)	React.js (Javascript Library) (1,130)
HyperText Markup Language (HTML) (1,203)	Management (499)	Application Programming Interface (API) (798)
Computer Science (1,201)	Innovation (490)	Node.js (Javascript Library) (683)
React.js (Javascript Library) (1,130)	Leadership (475)	Git (Version Control System) (658)
User Interface (UI) (1,094)	Troubleshooting (Problem Solving) (473)	Amazon Web Services (605)
Agile Methodology (925)	Writing (461)	Angular (Web Framework) (605)
Application Programming Interface (API) (798)	Customer Service (430)	Figma (Design Software) (580)

The top specialized, soft, and computer skills listed by those most frequently mentioned in job postings (denoted in parentheses) for the above middle occupations in this report are shown in Exhibit 11.

Exhibit 11: Top Skills for Above Middle-Skill Occupations by Number of Job Postings (n=3,642)

Top Specialized Skills	Top Soft Skills	Top Computer Skills
Adobe Photoshop (1,848)	Communications (1,744)	Adobe Photoshop (1,848)
Graphic Design (1,801)	Detail Oriented (1,131)	Adobe Illustrator (1,725)
Adobe Illustrator (1,725)	Presentations (638)	Adobe InDesign (1,130)
Marketing (1,417)	Ability to Meet Deadlines (565)	Adobe Creative Suite (1,090)
Adobe InDesign (1,130)	Packaging and Labeling (563)	Adobe After Effects (491)
Adobe Creative Suite (1,090)	Self-Motivation (523)	Microsoft PowerPoint (414)
Typography (842)	Time Management (522)	Microsoft Office (312)
Animations (610)	Innovation (498)	Autodesk Maya (297)
Branding (581)	Sales (490)	HTML (HyperText Markup Language) (289)
Project Management (552)	Problem Solving (467)	Microsoft Excel (281)

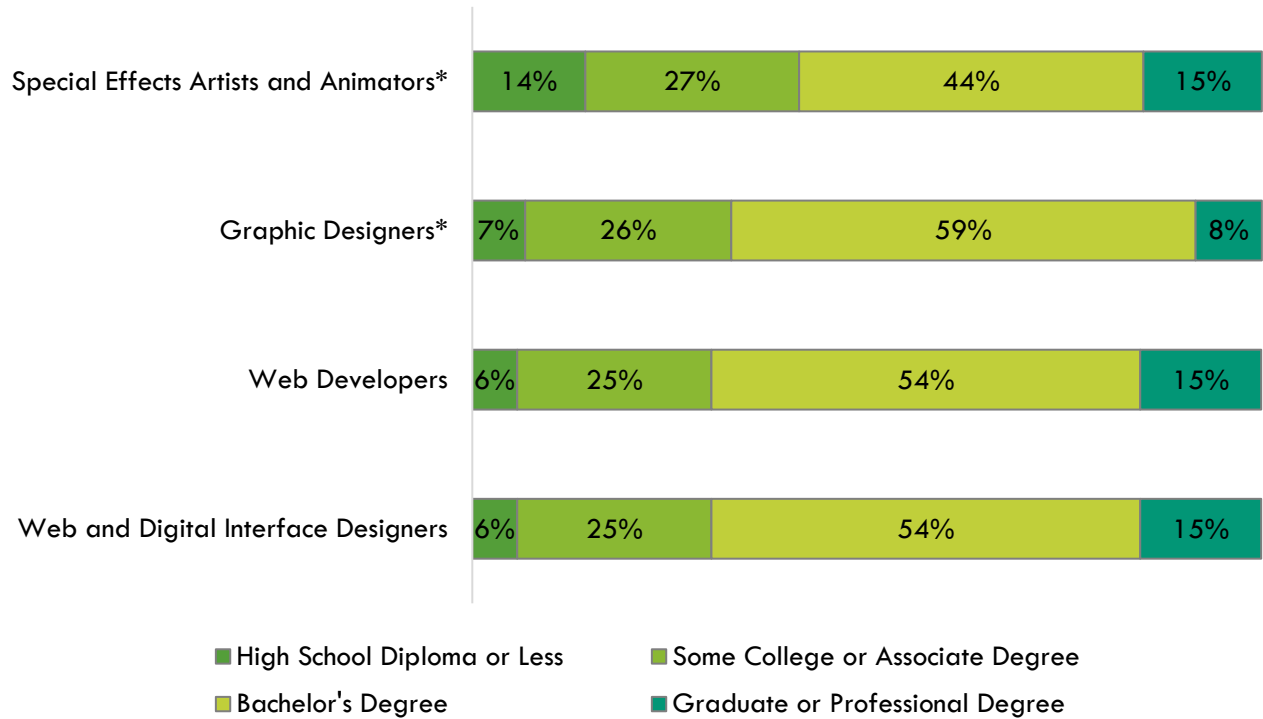
Educational Attainment:

The Bureau of Labor Statistics (BLS) lists a bachelor's degree as the typical entry-level education for these immersive media and emerging technologies occupations. Additionally, the national-level educational attainment data indicates approximately 25% of workers in the middle-skill occupations have completed some college or associate degree as their highest level of education. Between 26% and 27% of workers in the above middle-skill occupations have completed some college or an associate degree. Additionally, the majority of workers in these occupations have completed a bachelor's degree as their highest level of education. Exhibit 12 shows the educational attainment for each occupation, sorted by highest community college educational attainment to lowest.

Of the 46% of cumulative job postings for these middle-skill immersive media and emerging technologies occupations that listed a minimum education requirement in Los Angeles/Orange County, 94% (2,177) requested a bachelor's degree and 6% (164) requested a high school diploma or an associate degree.

Of the 49% of cumulative job postings for these above middle-skill immersive media and emerging technologies occupations that listed a minimum education requirement in Los Angeles/Orange County, 80% (1,417) requested a bachelor's degree and 19% (339) requested a high school diploma or an associate degree.

Exhibit 12: National-level Educational Attainment for Occupations



Educational Supply

Community College Supply:

Exhibit 13 shows the three-year average number of awards conferred by community colleges in the related TOP codes:

- Digital Media (0614.00)
- Multimedia (0614.10)
- Electronic Game Design (0614.20)
- Website Design and Development (0614.30)
- Animation (0614.40)
- Computer Graphics and Digital Imagery (0614.60)
- Information Technology, General (0701.00)
- Computer Information Systems (0702.00)
- Software Applications (0702.10)
- Computer Software Development (0707.00)
- Computer Programming (0707.10)
- World Wide Web Administration (0709.00)
- E-Commerce (technology emphasis) (0709.10)
- Applied Design (1009.00)
- Commercial Art (1013.00)
- Graphic Art and Design (1030.00)

The colleges with the most completions in the region are Mt. San Antonio, Orange Coast, Santa Monica, and Long Beach. Over the past 12 months, there were five other related program recommendation requests from regional community colleges.

Exhibit 13: Regional Community College Awards (Certificates and Degrees), 2019-2022

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
0614.00	Digital Media	Glendale	1	0	0	0
		LA Mission	4	5	5	5
		LA Trade	11	18	12	14
		Pasadena	0	3	15	6
		Rio Hondo	2	1	1	1
		Santa Monica	0	0	19	6
		LA Subtotal	18	27	52	32
		Coastline	0	3	3	2
		Cypress	0	2	7	3
		Golden West	10	7	0	6
		Irvine	1	6	3	3
		Saddleback	0	1	1	1
		Santa Ana	1	6	34	13
		OC Subtotal	12	25	48	28
Supply Subtotal/Average			30	52	100	60
0614.10	Multimedia	East LA	2	0	0	1
		Glendale	0	0	4	1
		LA Mission	18	23	28	23
		Pasadena	1	0	0	0

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
		Santa Monica	5	9	0	5
		LA Subtotal	26	32	32	30
		Cypress	1	1	3	1
		Orange Coast	2	4	8	4
		Santiago Canyon	3	4	0	2
		OC Subtotal	6	9	11	7
		Supply Subtotal/Average	32	41	43	37
0614.20	Electronic Game Design	Pasadena	1	1	5	3
		LA Subtotal	1	1	5	3
		Golden West	2	0	0	0
		OC Subtotal	2	0	0	0
Supply Subtotal/Average		3	1	5	3	
0614.30	Website Design and Development	Citrus	0	0	1	0
		LA Pierce	2	4	5	4
		Mt San Antonio	7	6	1	5
		Pasadena	1	1	7	3
		Santa Monica	2	3	2	2
		West LA	0	0	3	1
		LA Subtotal	12	14	19	15
		Coastline	1	1	0	1
		Fullerton	0	1	2	1
		Irvine	0	5	4	2
		Orange Coast	9	7	13	10
		Saddleback	2	7	4	5
		Santa Ana	2	1	0	1
		Santiago Canyon	3	6	5	5
OC Subtotal	17	28	28	25		
Supply Subtotal/Average		29	42	47	40	
0614.40	Animation	Cerritos	13	4	7	8
		East LA	12	12	17	14
		El Camino	5	4	4	4
		Glendale	6	2	6	4
		LA City	0	1	2	1
		LA Mission	11	5	11	9
		Mt San Antonio	58	43	26	43
		Pasadena	1	6	12	6
		Rio Hondo	9	9	10	9
		Santa Monica	19	69	103	64

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
		LA Subtotal	134	155	198	162
		Coastline	0	1	1	1
		Cypress	1	0	0	0
		Fullerton	1	0	0	0
		Irvine	1	3	2	2
		Orange Coast	1	0	0	0
		OC Subtotal	4	4	3	3
Supply Subtotal/Average			138	159	201	165
0614.60	Computer Graphics and Digital Imagery	Citrus	12	26	7	15
		East LA	1	2	2	2
		Mt San Antonio	0	1	0	0
		LA Subtotal	13	29	9	17
		Coastline	1	0	0	0
		Cypress	5	0	0	2
		Fullerton	1	3	0	1
		Irvine	0	0	4	1
		North Orange Adult	3	0	0	1
		Orange Coast	21	31	28	27
		Saddleback	4	2	3	3
		Santa Ana	11	3	2	5
		OC Subtotal	46	39	37	40
		Supply Subtotal/Average			59	68
0701.00	Information Technology, General	East LA	10	4	30	15
		Glendale	0	3	17	7
		LA Harbor	0	1	2	1
		LA Mission	3	1	4	3
		LA Southwest	0	2	12	5
		Long Beach	64	106	88	85
		Mt San Antonio	90	49	23	53
		Santa Monica	0	1	0	0
		West LA	5	0	6	4
		LA Subtotal	172	167	182	173
		Santa Ana	0	3	9	4
		OC Subtotal	0	3	9	4
Supply Subtotal/Average			172	170	191	177
0702.00	Computer Information Systems	Citrus	8	4	6	6
		Compton	0	0	12	4
		East LA	15	23	11	16

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
		El Camino	21	11	28	20
		Glendale	5	6	8	6
		LA City	1	4	3	3
		LA Harbor	0	0	1	0
		LA Mission	1	1	1	1
		LA Southwest	0	0	21	7
		LA Trade	20	15	17	17
		Long Beach	0	3	0	1
		Mt San Antonio	79	6	68	51
		Rio Hondo	10	6	15	11
		West LA	10	9	14	11
		LA Subtotal	170	88	205	154
		Coastline	0	0	2	0
		Cypress	4	0	0	1
		Fullerton	11	31	49	30
		Irvine	2	0	0	1
		Orange Coast	2	0	1	1
		Saddleback	0	1	0	0
		Santa Ana	2	16	18	12
		Santiago Canyon	4	1	1	2
		OC Subtotal	25	49	71	47
		Supply Subtotal/Average	195	137	276	201
0702.10	Software Applications	Cerritos	6	2	8	5
		LA City	1	1	0	1
		LA Mission	0	3	0	1
		LA Southwest	0	0	3	1
		Long Beach	7	0	0	2
		Mt San Antonio	2	0	1	1
		Santa Monica	13	6	12	11
		LA Subtotal	29	12	24	22
		Coastline	8	8	14	10
		Cypress	0	0	2	0
		Irvine	48	50	89	62
		Saddleback	7	11	10	9
		OC Subtotal	63	69	115	81
		Supply Subtotal/Average	92	81	139	103

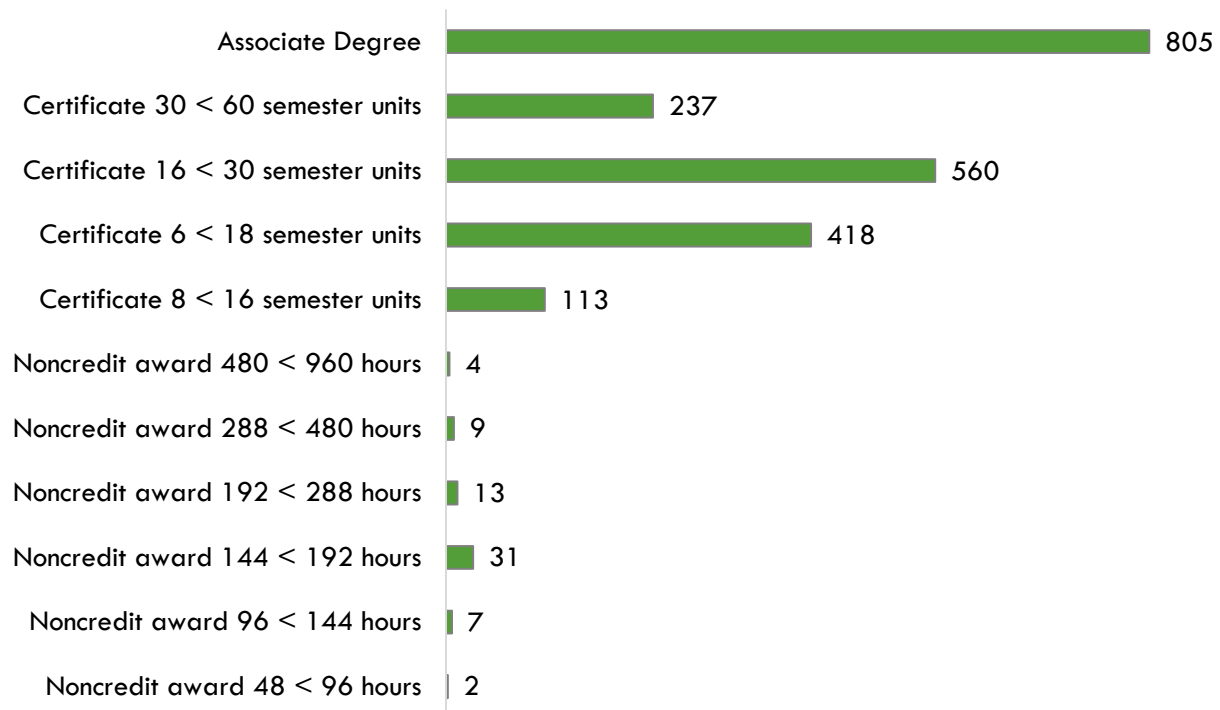
TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average		
0707.00	Computer Software Development	LA City	0	0	1	0		
		LA Harbor	0	0	2	1		
		LA Mission	0	0	2	1		
		LA Pierce	0	4	7	4		
		Santa Monica	0	1	1	1		
		West LA	0	0	6	2		
		LA Subtotal	0	5	19	9		
		Cypress	1	0	0	0		
		Golden West	2	6	4	4		
		Orange Coast	2	2	0	2		
		Saddleback	3	10	15	10		
		OC Subtotal	8	18	19	16		
		Supply Subtotal/Average			8	23	38	25
		0707.10	Computer Programming	Cerritos	2	3	7	4
Citrus	1			3	9	4		
East LA	4			1	0	2		
Glendale	3			0	0	1		
LA City	6			8	10	8		
LA Harbor	0			2	4	2		
LA Mission	4			7	7	7		
LA Pierce	4			5	5	4		
LA Southwest	1			2	2	2		
LA Valley	6			13	8	9		
Long Beach	5			3	7	5		
Mt San Antonio	114			83	125	107		
Pasadena	21			23	23	22		
Santa Monica	46			65	71	61		
LA Subtotal	217			218	278	238		
Coastline	0			0	1	0		
Cypress	20			6	5	11		
Fullerton	28			24	28	27		
Irvine	4			0	0	1		
Orange Coast	157			206	160	175		
Santa Ana	1			0	0	0		
Santiago Canyon	3			2	2	2		
OC Subtotal	213			238	196	216		
Supply Subtotal/Average			430	456	474	454		

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
0709.00	World Wide Web Administration	Cerritos	0	0	3	1
		Glendale	7	10	7	8
		LA Pierce	0	2	0	0
		Long Beach	24	34	44	34
		Santa Monica	0	16	0	5
		West LA	9	6	7	7
		LA Subtotal	40	68	61	55
		Fullerton	0	1	0	0
		Saddleback	2	2	3	2
		OC Subtotal	2	3	3	2
Supply Subtotal/Average			42	71	64	57
0709.10	E-Commerce (technology emphasis)	East LA	1	1	2	1
		LA Subtotal	1	1	2	1
		Saddleback	1	0	2	1
		OC Subtotal	1	0	2	1
Supply Subtotal/Average			2	1	4	2
1009.00	Applied Design	Orange Coast	0	1	0	0
		OC Subtotal	0	1	0	0
		Supply Subtotal/Average			0	1
1013.00	Commercial Art	El Camino	0	0	1	0
		LA Trade	23	22	33	26
		LA Valley	7	14	8	10
		Pasadena	0	2	6	3
		LA Subtotal	30	38	48	39
		Cypress	1	0	0	0
		Fullerton	2	5	5	4
		Orange Coast	5	1	9	5
		Santa Ana	1	3	1	2
		OC Subtotal	9	9	15	11
Supply Subtotal/Average			39	47	63	50
1030.00	Graphic Art and Design	Cerritos	11	14	13	13
		East LA	3	8	6	6
		El Camino	1	0	0	0
		Glendale	4	9	10	8
		LA City	22	8	19	16
		LA Pierce	15	13	22	17
		LA Valley	5	1	5	4
		Long Beach	2	8	7	6

TOP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2021-2022 Awards	3-Year Award Average
		Mt San Antonio	11	20	21	18
		Pasadena	7	15	12	11
		Rio Hondo	20	28	23	24
		Santa Monica	50	43	51	48
		LA Subtotal	151	167	189	171
		Cypress	0	4	6	3
		Fullerton	12	14	15	14
		Golden West	32	20	16	22
		Irvine	16	21	27	21
		Saddleback	15	19	22	19
		Santa Ana	3	3	0	2
		Santiago Canyon	1	4	5	4
		OC Subtotal	79	85	91	85
		Supply Subtotal/Average	230	252	280	256
		Supply Total/Average	1,501	1,602	1,971	1,687

Exhibit 14 shows the annual average community college awards by type from 2019-20 through 2021-22. The plurality of the awards are for associate degrees (805), followed by certificates between 16 and less than 30 semester units (560), and certificates between 6 and less than 18 semester units (418).

Exhibit 14: Annual Average Community College Awards by Type, 2019-2022



Community College Student Outcomes:

Exhibit 15 shows the Strong Workforce Program (SWP) metrics for digital media programs in North Orange County Community College District (NOCCCD), the Orange County Region, and California. Of the 1,468 digital media students in the 2020-21 academic year, 15% (223) attended a NOCCCD college.

NOCCCD students that exited digital media programs in the 2020-21 academic year had higher median annual earnings (\$39,160) compared to all digital media students in Orange County (\$32,614). A higher percentage of NOCCCD digital media students attained the living wage (45%) when compared to all digital media students in Orange County (35%) and the state (39%).

Exhibit 15: Digital Media (0614.00) Strong Workforce Program Metrics, 2020-21⁵

SWP Metric	NOCCCD	OC Region	California
SWP Students	223	1,468	9,233
SWP Students Who Earned 9 or More Career Education Units in the District in a Single Year	41%	29%	31%
SWP Students Who Completed a Noncredit CTE or Workforce Preparation Course	Insufficient Data	82%	78%
SWP Students Who Earned a Degree or Certificate or Attained Apprenticeship Journey Status	Insufficient Data	13	284
SWP Students Who Transferred to a Four-Year Postsecondary Institution (2019-20)	Insufficient Data	102	665
SWP Students with a Job Closely Related to Their Field of Study (2019-20)	Insufficient Data	55%	55%
Median Annual Earnings for SWP Exiting Students	\$39,160 (\$18.83)	\$32,614 (\$15.68)	\$31,988 (\$15.38)
Median Change in Earnings for SWP Exiting Students	12%	32%	23%
SWP Exiting Students Who Attained the Living Wage	45%	35%	39%

⁵ All SWP metrics are for 2020-21 unless otherwise noted.

Non-Community College Supply:

For a comprehensive regional supply analysis, it is also important to consider the supply from other institutions in the region that provide training programs for these immersive media and emerging technologies occupations. Exhibit 16 shows the annual and two-year average number of awards conferred by these institutions in the related Classification of Instructional Programs (CIP) Codes:

- Digital Communication and Media/Multimedia (09.0702)
- Animation, Interactive Technology, Video Graphics, and Special Effects (10.0304)
- Computer and Information Sciences, General (11.0101)
- Computer Programming/Programmer, General (11.0201)
- Computer Science (11.0701)
- Web Page, Digital/Multimedia and Information Resources Design (11.0801)
- Computer Graphics (11.0803)
- Web/Multimedia Management and Webmaster (11.1004)
- Digital Arts (50.0102)
- Design and Visual Communications, General (50.0401)
- Commercial and Advertising Art (50.0402)
- Industrial and Product Design (50.0404)
- Graphic Design (50.0409)
- Game and Interactive Media Design (50.0411)

Due to different data collection periods, the most recent two-year period of available data is presented, from 2019 to 2021. Between 2020 and 2021, non-community college institutions in the region conferred an average of 4,436 awards annually in related training programs.

Exhibit 16: Regional Non-Community College Awards, 2019-2021

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
09.0702	Digital Communication and Media/Multimedia	California State University-Dominguez Hills	41	57	49
		Columbia College Hollywood	0	28	14
		Fremont College	1	0	0
		Marymount California University	10	9	10
		Vanguard University of Southern California	2	1	2
Supply Subtotal/Average			54	95	75
10.0304	Animation, Interactive Technology, Video Graphics, and Special Effects	ABC Adult School	0	1	0
		Art Center College of Design	36	41	38
		California Institute of the Arts	39	37	38
		Chapman University	20	22	21
		Columbia College Hollywood	0	11	6
		Gnomon	66	0	33
		Laguna College of Art and Design	33	25	29
		Los Angeles Film School	47	35	42
		Loyola Marymount University	21	26	24
		New York Film Academy	24	10	16
Supply Subtotal/Average			286	208	247

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
11.0101	Computer and Information Sciences, General	Azusa Pacific University	21	25	23
		Chapman University	18	23	20
		Los Angeles Pacific College	6	2	4
		Loyola Marymount University	27	45	36
		Mount Saint Mary's University	0	0	0
		Pacific States University	0	0	0
		Pitzer College	0	1	0
		The Master's University and Seminary	11	5	8
		University of California-Irvine	0	1	0
		University of La Verne	23	36	30
		University of Massachusetts Global	30	36	33
		University of the People	203	292	248
		Westcliff University	0	0	0
Supply Subtotal/Average			339	466	402
11.0201	Computer Programming/ Programmer, General	ABCO Technology	46	34	40
		Platt College-Anaheim	4	0	2
Supply Subtotal/Average			50	34	42
11.0701	Computer Science	Biola University	18	19	18
		California Institute of Technology	72	83	78
		California State Polytechnic University-Pomona	238	270	254
		California State University-Dominguez Hills	57	66	62
		California State University-Fullerton	264	308	286
		California State University-Long Beach	220	221	220
		California State University-Los Angeles	119	152	136
		California State University-Northridge	160	214	187
		Chapman University	30	45	38
		Claremont McKenna College	35	17	26
		Harvey Mudd College	47	48	48
		Occidental College	18	18	18
		Pitzer College	10	5	8
		Pomona College	34	33	34
		Scripps College	11	5	8
		Southern California Institute of Technology	10	7	8
The Master's University and Seminary	0	0	0		

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
		University of California-Irvine	805	822	814
		University of California-Los Angeles	287	342	314
		University of Southern California	247	293	270
Supply Subtotal/Average			2,682	2,968	2,827
11.0801	Web Page, Digital/Multimedia and Information Resources Design	Los Angeles Pacific College	0	4	2
		Westcliff University	0	0	0
Supply Subtotal/Average			0	4	2
11.0803	Computer Graphics	ABC Adult School	4	3	4
		Los Angeles Pacific College	12	5	8
Supply Subtotal/Average			16	8	12
11.1004	Web/Multimedia Management and Webmaster	ABCO Technology	37	35	36
		Los Angeles Pacific College	1	1	0
Supply Subtotal/Average			38	36	36
50.0102	Digital Arts	Columbia College Hollywood	0	15	8
		Gnomon	0	31	16
		Los Angeles Academy of Figurative Art	4	0	2
		Los Angeles Pacific College	4	2	3
		Marymount California University	3	2	2
		Otis College of Art and Design	48	52	50
		University of Southern California	15	37	26
		Woodbury University	2	0	1
Supply Subtotal/Average			76	139	108
50.0401	Design and Visual Communications, General	Bethesda University	0	0	0
		Biola University	3	9	6
		California State Polytechnic University-Pomona	0	0	0
		Columbia College Hollywood	0	7	4
		FIDM-Fashion Institute of Design & Merchandising-Los Angeles	90	69	79
		Gnomon	19	42	30
		Los Angeles Pacific College	13	1	7
		Otis College of Art and Design	36	30	33
		University of California-Los Angeles	0	0	0
		University of La Verne	0	0	0

CIP Code	Program	College	2019-2020 Awards	2020-2021 Awards	2-Year Award Average
		University of Southern California	5	22	14
Supply Subtotal/Average			166	180	173
50.0402	Commercial and Advertising Art	Art Center College of Design	16	7	12
		Mount Saint Mary's University	1	0	0
		Woodbury University	10	13	12
Supply Subtotal/Average			27	20	24
50.0404	Industrial and Product Design	California State University-Long Beach	34	34	34
		FIDM-Fashion Institute of Design & Merchandising-Los Angeles	31	18	24
		Otis College of Art and Design	15	43	29
Supply Subtotal/Average			80	95	87
50.0409	Graphic Design	Art Center College of Design	67	75	71
		California Institute of the Arts	12	12	12
		California State Polytechnic University-Pomona	89	113	101
		Chapman University	27	24	26
		Columbia College Hollywood	0	9	4
		Concordia University-Irvine	10	7	8
		FIDM-Fashion Institute of Design & Merchandising-Los Angeles	38	25	32
		Laguna College of Art and Design	25	26	26
		Los Angeles Film School	28	47	38
		Los Angeles Pacific College	8	2	5
		New York Film Academy	0	0	0
		Otis College of Art and Design	0	0	0
		University of La Verne	0	0	0
Supply Subtotal/Average			304	340	323
50.0411	Game and Interactive Media Design	Laguna College of Art and Design	34	44	39
		New York Film Academy	7	6	7
		University of California-Irvine	0	0	0
		University of Southern California	28	24	26
		Woodbury University	6	7	6
Supply Subtotal/Average			75	81	78
Supply Total/Average			4,193	4,674	4,436

Regional Demographics

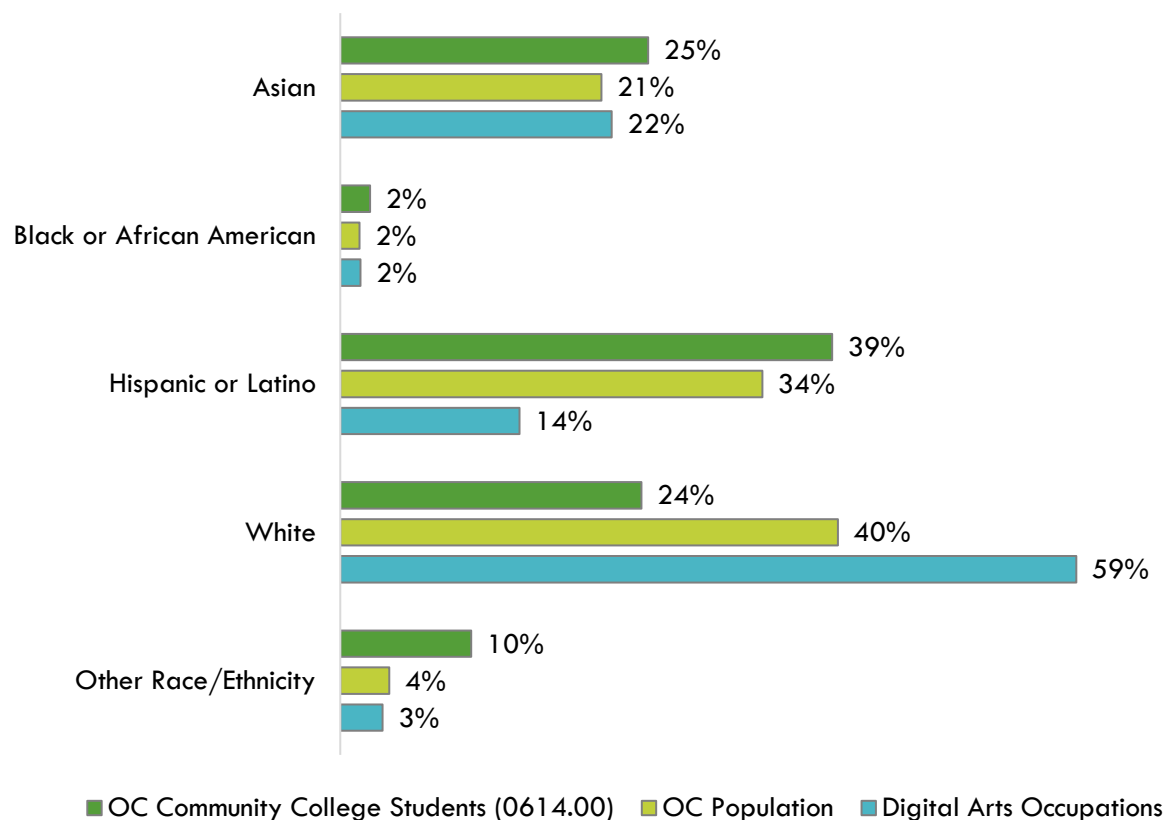
This section analyzes demographic data for Orange County community college students enrolled in digital media programs compared to the OC population, as well occupational data, for the purpose of identifying potential diversity and equity issues that can be addressed by community college programs.

Ethnicity:

Exhibit 17 shows the ethnicity of Orange County community college students enrolled in digital media programs compared to the overall Orange County population, as well as the four immersive media and emerging technologies occupations included in this report. Nearly two-thirds (59%) of workers in these immersive media and emerging technologies occupations are white, which is considerably higher than the population (40%) and more than twice the number of community college digital media students (24%). Notably, Hispanic or Latino students comprise the largest group of digital media students (39%), but represent only 14% of immersive media and emerging technologies occupations.

Examining disaggregated data for each occupation (not shown), white workers also comprise the largest group of workers in each of these four immersive media and emerging technologies occupations, representing 70% of *special effects artists and animators*, 58% of *web developers*, 55% of *web and digital interface designers*, and 52% of *graphic designers*.

Exhibit 17: Program and County Demographics by Ethnicity

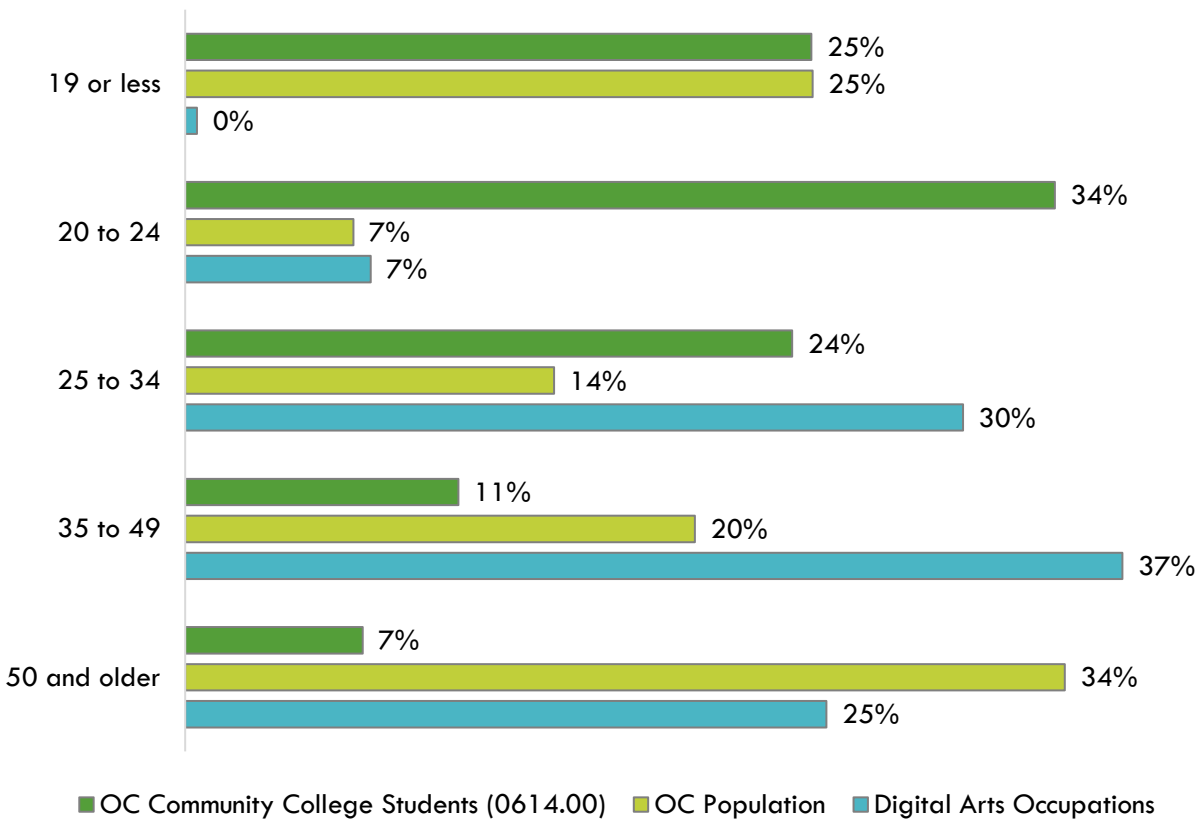


Age:

Exhibit 18 shows the age of Orange County community college students enrolled in digital media programs compared to the overall Orange County population, as well as the four immersive media and emerging technologies occupations included in this report. The vast majority (92%) of workers in these immersive media and emerging technologies occupations are 25 or older, and more than two-thirds (67%) of workers are 25 to 49. This is more than the population, with those 25 years or older comprising only 69% of the Orange County population. Community college digital media students are largely younger, with 82% of students aged 34 years or less.

Examining disaggregated data for each occupation (not shown), *web and digital interface designers* have the youngest workers, with 52% of workers 34 or less. Conversely, 65% of *graphic designers*, 64% of *special effects artists and animators*, and 54% of *web developers* are 35 and older.

Exhibit 18: Program and County Demographics by Age

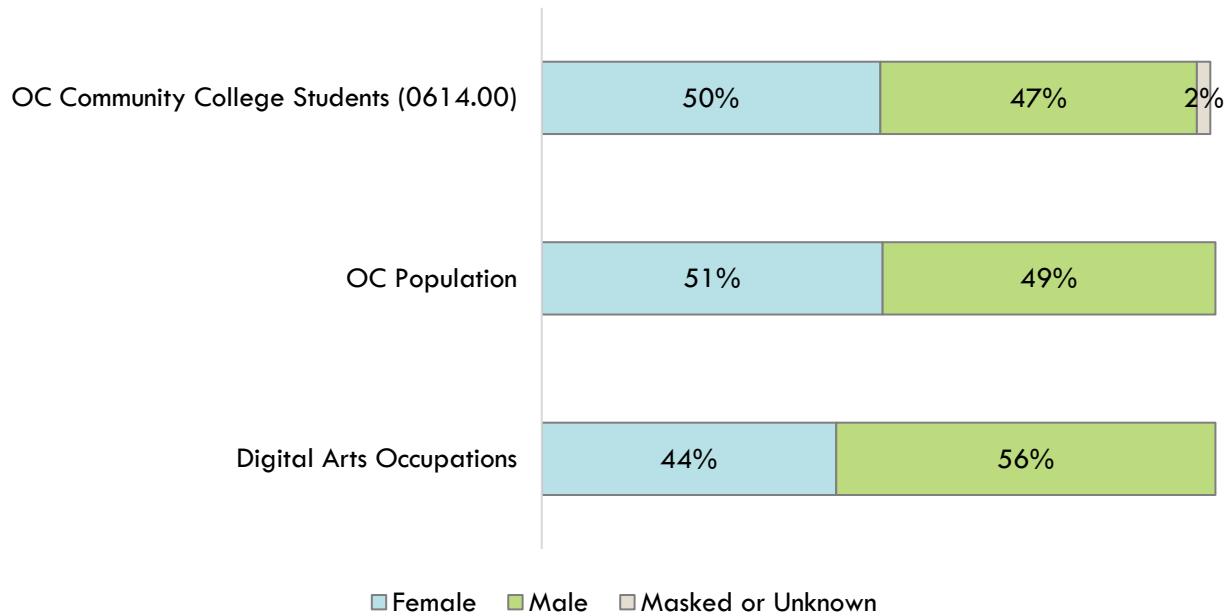


Sex:

Exhibit 19 shows the sex of Orange County community college students enrolled in digital media programs compared to the overall Orange County population as well as the four immersive media and emerging technologies occupations included in this report.

While men and women are almost evenly represented among the population and digital media students, more men (56%) than women are employed in these immersive media and emerging technologies occupations. Examining disaggregated data for each occupation (not shown), a majority of *web developers* (80%) and *web and digital interface designers* (62%) are men. Approximately 45% of *special effects artists and animators* are women, while *graphic designers* are equally represented by both men and women.

Exhibit 19: Program and County Demographics by Sex



Appendix A: Methodology

The OC COE prepared this report by analyzing data from occupations and education programs. Occupational data is derived from Lightcast, a labor market analytics firm that consolidates data from the California Employment Development Department (EDD), U.S. Bureau of Labor Statistics (BLS) and other government agencies. Program supply data is drawn from two systems: Taxonomy of Programs (TOP) and Classification of Instructional Programs (CIP).

Using a TOP-SOC crosswalk, the OC COE identified middle-skill jobs for which programs within these TOP codes train. Middle-skill jobs include:

- All occupations that require an educational requirement of some college, associate degree or apprenticeship;
- All occupations that require a bachelor's degree, but also have more than one-third of their existing labor force with an educational attainment of some college or associate degree; or
- All occupations that require a high school diploma or equivalent or no formal education, but also require short- to long-term on-the-job training where multiple community colleges have existing programs.

The OC COE determined labor market supply for an occupation or SOC code by analyzing the number of program completers or awards in a related TOP or CIP code. The COE developed a "supply table" with this information, which is the source of the program supply data for this report. TOP code data comes from the California Community Colleges Chancellor's Office MIS Data Mart (datamart.cccco.edu) and CIP code data comes from the Integrated Postsecondary Education Data System (nces.ed.gov/ipeds/use-the-data), also known as IPEDS. TOP is a system of numerical codes used at the state level to collect and report information on California community college programs and courses throughout the state that have similar outcomes. CIP codes are a taxonomy of academic disciplines at institutions of higher education in the United States and Canada. Institutions outside of the California Community College system do not use TOP codes in their reporting systems.

Data included in this analysis represent the labor market demand for relevant positions most closely related to the proposed program as expressed by the requesting college in consultation with the OC COE. Traditional labor market information was used to show current and projected employment based on data trends, as well as annual average awards granted by regional community colleges. Real-time labor market information captures job post advertisements for occupations relevant to the field of study which can signal demand and show what employers are looking for in potential employees, but is not a perfect measure of the quantity of open positions.

All representations have been produced from primary research and/or secondary review of publicly and/or privately available data and/or research reports. The most recent data available at the time of the analysis was examined; however, data sets are updated regularly and may not be consistent with previous reports. Efforts have been made to qualify and validate the accuracy of the data and findings; however, neither the Centers of Excellence for Labor Market Research (COE), COE host district, nor California Community Colleges Chancellor's Office are responsible for the applications or decisions made by individuals and/or organizations based on this study or its recommendations.

Appendix B: Data Sources

Data Type	Source
Occupational Projections, Wages, and Job Postings	<p>Traditional labor market information data is sourced from Lightcast, a labor market analytics firm. Lightcast occupational employment data are based on final Lightcast industry data and final Lightcast staffing patterns. Wage estimates are based on Occupational Employment Statistics and the American Community Survey. For more information, see https://lightcast.io/</p>
Living Wage	<p>The living wage is derived from the Insight Center’s California Family Needs Calculator, which measures the income necessary for an individual of family to afford basic expenses. The data assesses the cost of housing, food, child care, health care, transportation, and taxes. For more information, see: https://insightccd.org/family-needs-calculator/</p> <p>The living wage for one adult in Orange County is \$20.63 per hour (\$42,910.40 annually). This figure is used by the CCCCCO to calculate the percentage of students that attained the regional living wage.</p>
Typical Education and Training Requirements, and Educational Attainment	<p>The Bureau of Labor Statistics (BLS) provides information about education and training requirements for hundreds of occupations. 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 BLS publishes projections data. For more information, see https://www.bls.gov/emp/documentation/education/tech.htm</p>
Emerging Occupation Descriptions, Additional Education Requirements, and Employer Preferences	<p>The O*NET database includes information on skills, abilities, knowledges, work activities, and interests associated with occupations. For more information, see https://www.onetonline.org/help/online/</p>
Educational Supply	<p>The CCCCCO Data Mart provides information about students, courses, student services, outcomes and faculty and staff. For more information, see: https://datamart.cccco.edu</p> <p>The National Center for Education Statistics (NCES) Integrated Postsecondary Integrated Data System (IPEDS) collects data on the number of postsecondary awards earned (completions). For more information, see https://nces.ed.gov/ipeds/use-the-data/survey-components/7/completions</p>
Student Metrics and Demographics	<p>LaunchBoard, a statewide data system supported by the California Community Colleges Chancellor's Office and hosted by Cal-PASS Plus, provides data on progress, success, employment, and earnings outcomes for California community college students. For more information, see: https://www.calpassplus.org/LaunchBoard/Home.aspx</p>

Data Type	Source
Population and Occupation Demographics	<p>The Census Bureau's American Community Survey (ACS) is the premier source for detailed population and housing information. For more information, see: https://www.census.gov/programs-surveys/acs</p> <p>Data is sourced from IPUMS USA, a database providing access to ACS and other Census Bureau data products. For more information, see: https://usa.ipums.org/usa/about.shtml</p>

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