





CENTER OF EXCELLENCE  
FOR LABOR MARKET RESEARCH

**ORANGE COUNTY**

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A background image showing a woman with glasses and a plaid shirt working at a computer in a modern office or computer lab. She is looking at a monitor displaying data. Other people are visible in the background, also working at computers. The scene is dimly lit with blue ambient lighting.

ORANGE COUNTY SECTOR PROFILE:  
**INFORMATION AND  
COMMUNICATION  
TECHNOLOGIES (ICT)/  
DIGITAL MEDIA**

**2024**



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**ORANGE COUNTY  
REGIONAL CONSORTIUM**

**WORKFORCE  
DEVELOPMENT ALLIANCE**



California  
Community  
Colleges

# TABLE OF CONTENTS

Table of Contents ..... 1

Introduction..... 2

ICT/Digital Media Occupational Data Analysis ..... 3

Job Postings Information..... 8

Key Occupations Driving Employment..... 12

ICT/Digital Media Supply ..... 18

Demographics..... 20

Public Policy and Funding Opportunities ..... 22

Appendix A: Methodology ..... 23

Appendix B: Sector Occupations and TOP Codes..... 24

Appendix C: End Notes ..... 25

[Supplemental Appendices](#)<sup>1</sup> are available as a companion to this report and include the following:

Appendix D: ICT/Digital Media Demand – Labor Market Data

Appendix E: ICT/Digital Media Supply – Community College and Non-Community College Awards



# INTRODUCTION

This report is the first in a series of 12 sector profiles that aim to provide a comprehensive analysis of Orange County's occupational landscape. This series dives into each of the 12 community college sectors, offering historical and projected occupational insights while building upon foundational research established through the [Orange County Labor Market Overview](#).<sup>2</sup> This initial sector profile focuses on Information and Communication Technology and Digital Media (ICT/Digital Media), which the Orange County Region has ranked second out of the 12 sectors based on the Orange County Labor Market Overview and corresponding region-wide survey of community colleges and key partners.

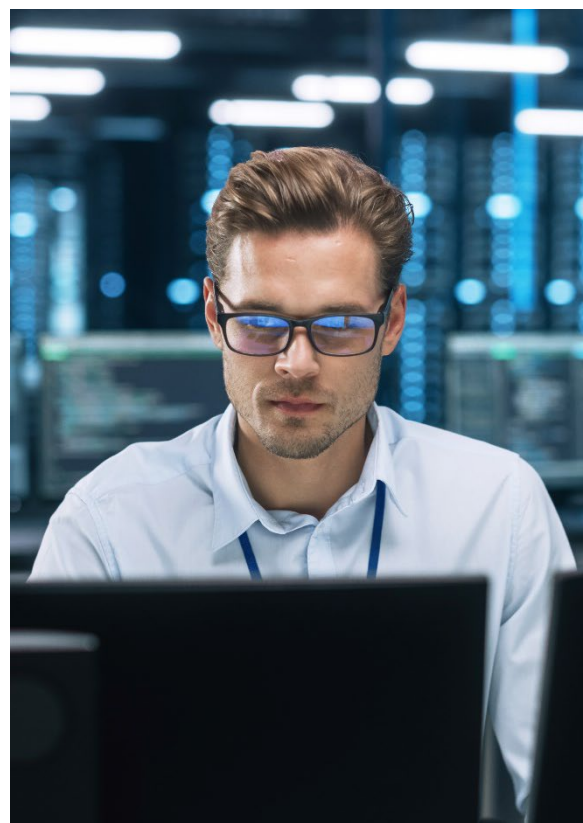
The ICT/Digital Media occupational sector includes two distinct areas: ICT (Information Communications Technology) and Digital Media. The ICT portion of this sector includes information technology workers such as help desk technicians, cybersecurity analysts, software developers, and more, which typically have high wages compared to all other occupations. Digital Media is comprised of numerous creative positions such as art directors, animators, graphic designers, and lighting and sound technicians that have higher rates of self-employment, but lower wages, when compared to all other occupations. Depending upon the occupation and job requirements, workers in this sector may need to obtain certification to demonstrate proficiency in a particular software.

The ICT/Digital Media sector is comprised of 49 occupations, 30 of which were highlighted in the Orange County Labor Market Overview. These 49 occupations account for 6% of the total number of occupations in the federal Bureau of Labor Statistics (BLS) Standard Occupational Classification (SOC) system and 20% (10) are in U.S. News & World Report's 100 Best Jobs of 2024 list.<sup>3</sup>

Of the 49 ICT/Digital Media occupations, 61% (30) are related to Digital Media and the remaining 39% (19) are related to ICT. Though Digital Media accounts for a higher number of occupations, ICT accounts for 73% of the jobs and 67% of annual openings in this sector. Additionally, entry-level wages for ICT occupations (\$40.90) are nearly double those of Digital Media occupations (\$21.08). Over 40% (8) of the ICT occupations are a U.S. News & World Report Best Job, while only 6% (2) of Digital Media occupation are a Best Job. Exhibit 1 shows the differences in several metrics for these two parts.

**Exhibit 1: ICT and Digital Media Comparison**

Metric	ICT	Digital Media
# of Occupations	19	30
# of 2022 Jobs	65,677	23,979
2022-2027 % Change	7%	5%
# of Annual Openings	5,686	2,858
Entry-Level Hourly Earnings	\$40.90	\$21.08
# of USN&WR Best Jobs 2024	8	2



Occupations are denoted throughout this report in italics, with their corresponding SOC code in parentheses. Middle-skill occupations have no special notation however, below middle-skill occupations are denoted with an \* and above middle-skill occupations denoted with a ^. Occupations that are on U.S. News & World Report's 2024 100 Best Jobs list denoted by #, such as, '*Software Developers (15-1252)*<sup>^#</sup>'.

By examining key aspects such as occupational trends, major employers, skills, program completions, and opportunities, the OC COE seeks to highlight underlying dynamics and intricacies shaping the ICT/Digital Media sector in Orange County. Community colleges and regional stakeholders can use this information for strategic planning and data-informed decision making to address workforce needs in this sector.

# ICT/DIGITAL MEDIA OCCUPATIONAL DATA ANALYSIS

## Orange County's Occupational Landscape

The ICT/Digital Media sector is comprised of 49 occupations that accounted for 89,656 jobs in 2022, representing 5% of all jobs in Orange County. These jobs are expected to grow by 6% through 2027, resulting in 8,544 projected annual openings.

### ICT/Digital Media Sector Key Facts



**89,656**

Number of Jobs  
in 2022



**5,681**

5-Year Change  
through 2027



**6%**

5-Year Percent  
Change



**8,544**

Annual  
Openings



**5,352**

Establishments



**\$5.98 - \$62.26**

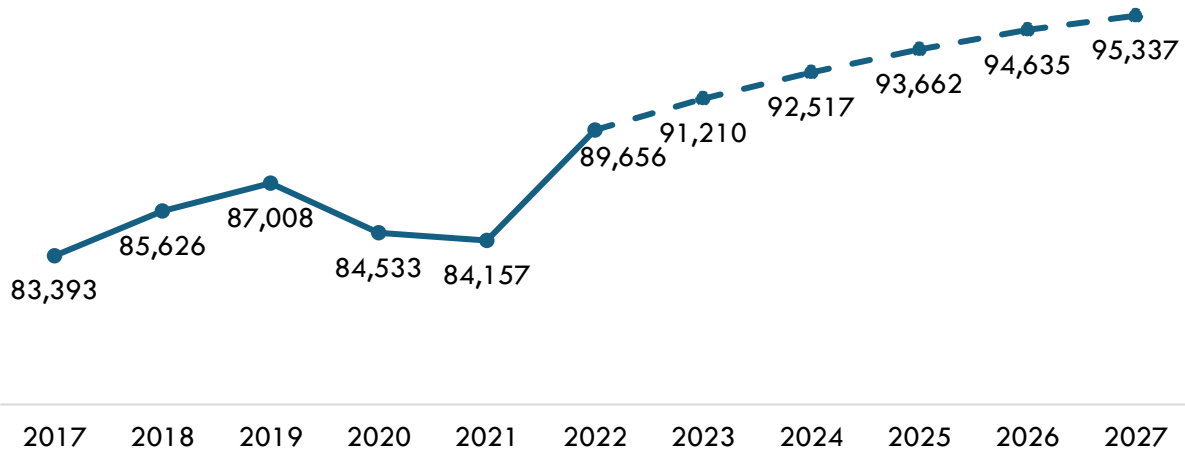
Occupational Entry-Level  
Wage Range



## Historical and Projected Employment

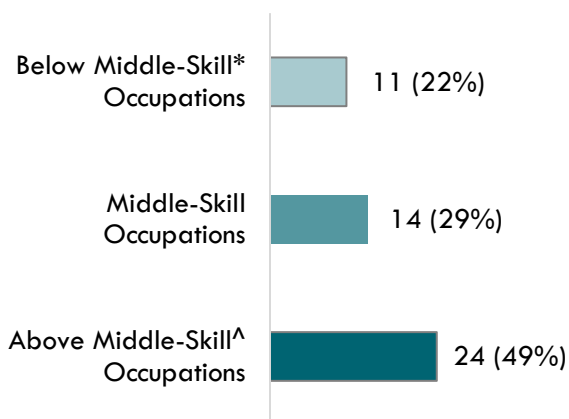
Over a 10-year period, from 2017 projected through 2027, ICT/Digital Media jobs have been and are projected to continue steadily rising at a consistent pace, except for 2020 and 2021 due to the COVID-19 pandemic-related economic downturn (Exhibit 2).

**Exhibit 2: Historical and Projected ICT/Digital Media Employment in Orange County (2017-2027)**

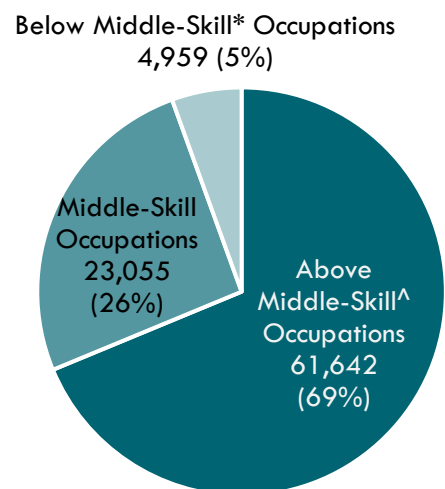


The 49 occupations in the ICT/Digital Media sector are categorized into 24 above middle-skill, 14 middle-skill, and 11 below middle-skill occupations (Exhibit 3). In 2022, the 24 above middle-skill occupations accounted for 61,642 jobs, constituting 69% of the total ICT/Digital Media workforce; followed by the 14 middle-skill occupations, with 23,055 jobs, representing 26% of the total workforce (Exhibit 4).

**Exhibit 3: Skill-Level for ICT/Digital Media Occupations**



**Exhibit 4: Breakdown of 2022 Jobs for ICT/Digital Media Occupations by Skill-Level**



*Note: Throughout this report, Below Middle-Skill Occupations are denoted with an \* and Above Middle-Skill Occupations are denoted with a ^.*

## Trends In Occupational Demand

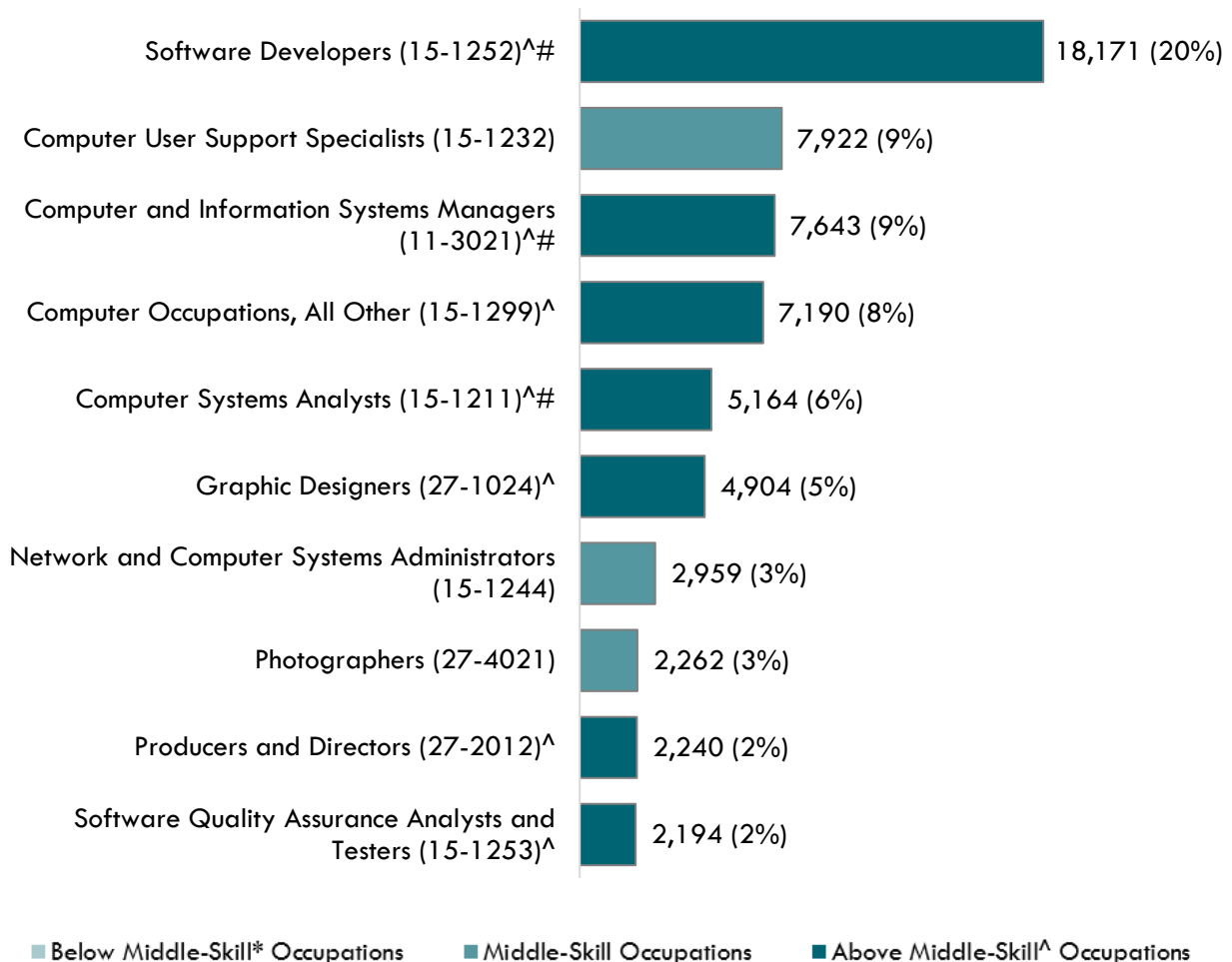
Following a national boom in information and technology jobs in 2022, the labor market for ICT/Digital Media jobs cooled in 2023, with the number of job postings throughout the country falling below pre-pandemic levels that May and have stayed below their pre-pandemic baseline as of February 2024.<sup>4</sup> Technology companies “over-hired” during the pandemic and laid-off workers in 2023 to “rebalance” their workforce nationwide.<sup>5</sup>

Despite these recent challenges, regionally, the 49 occupations in this sector accounted for nearly 90,000 jobs in 2022 and are estimated to have over 8,500 annual openings through 2027 in Orange County. Jobs in this sector are projected to grow at a similar rate to all occupations in Orange County through 2027 and one-third of the occupations have entry-level wages higher than the MIT Living Wage for Orange County of \$30.48.<sup>6</sup> However, over two-thirds of ICT/Digital Media jobs are for above middle-skill occupations — the second-highest of all twelve sectors.

### Jobs

Jobs equate to the number of people currently in an occupation as opposed to unmet demand, which refers to the number of people still needed in an occupation. Ranking first among all ICT/Digital Media occupations, *Software Developers (15-1252)^#*, an above middle-skill occupation, comprised 20% of all jobs in the sector. It is followed by *Computer User Support Specialists (15-1232)*, a middle-skill job, accounting for 9% of all ICT/Digital Media jobs, all of which are shown in the top 10 ICT/Digital Media jobs, 2022 in Exhibit 5.

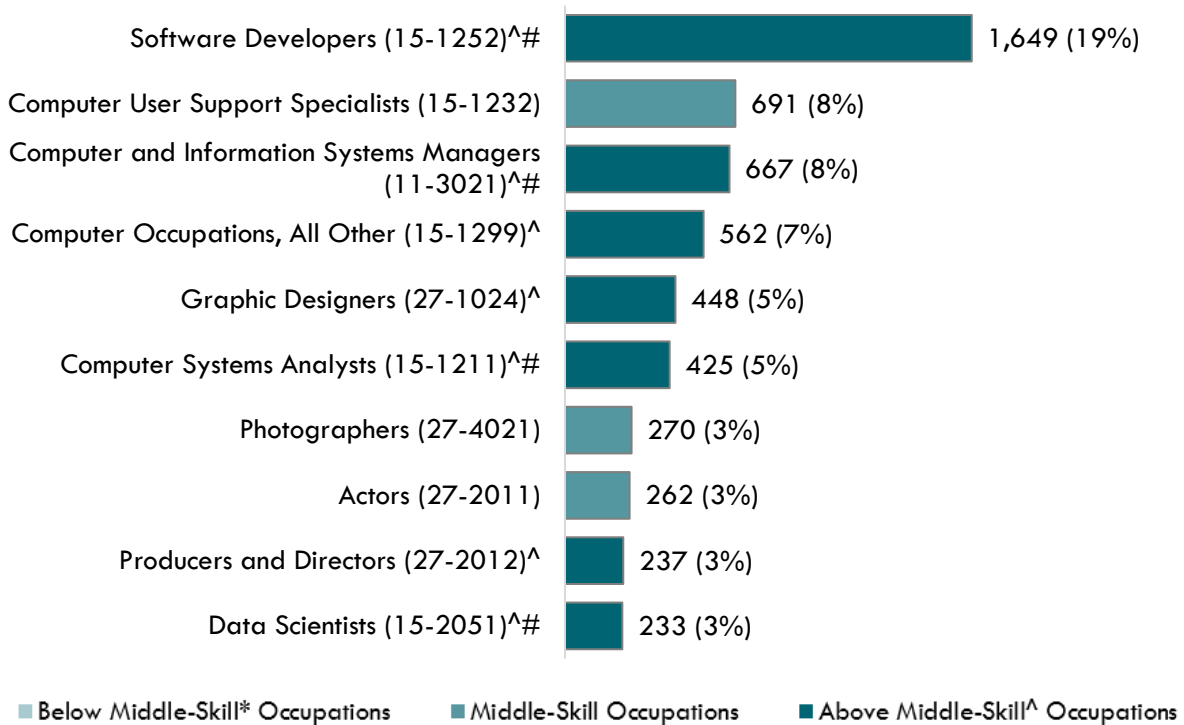
**Exhibit 5: Top 10 ICT/Digital Media Jobs, 2022**



## Annual Openings

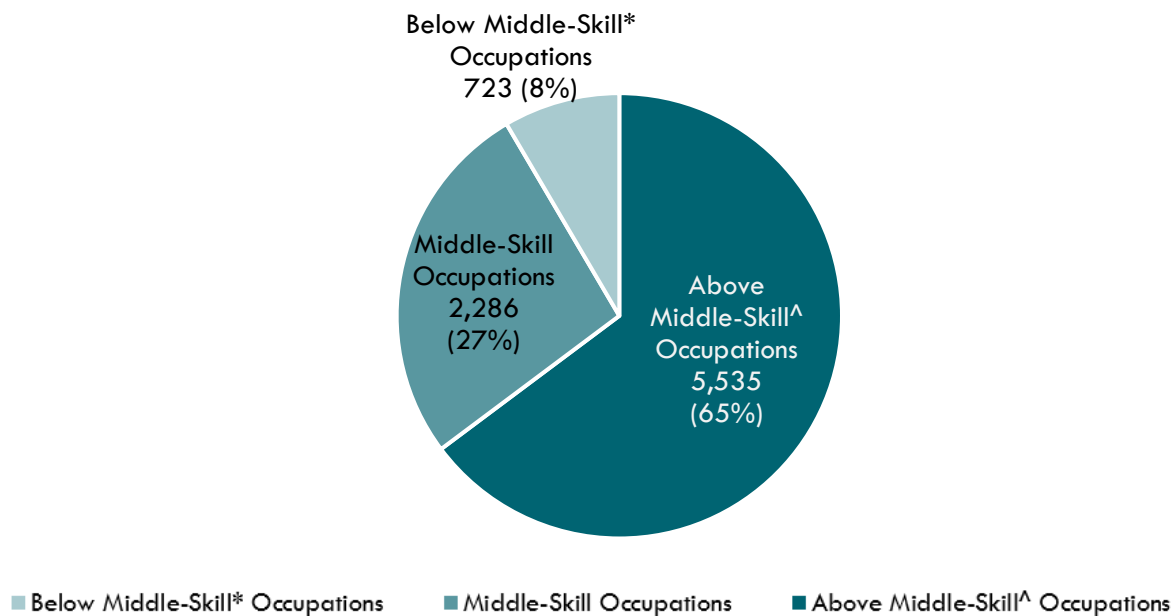
There are 8,544 ICT/Digital Media annual openings, also known as “demand” or “unmet demand”, in Orange County. Similar to its share in the number of jobs, *Software Developers (15-1252)^#* accounts for the largest percentage of ICT/Digital Media annual openings (20%), followed distantly by *Computer User Support Specialists (15-1232)* (8%) as shown along with ICT/Digital Media’s top 10 annual openings in Exhibit 6.

**Exhibit 6: Top 10 Annual Openings by ICT/Digital Media Occupation**



Above middle-skill occupations comprise 65% of all annual openings in the ICT/Digital Media sector followed by middle-skill occupations (27%). Exhibit 7 shows the annual openings by skill-level.

**Exhibit 7: Distribution of All ICT/Digital Media Annual Openings by Skill-Level**

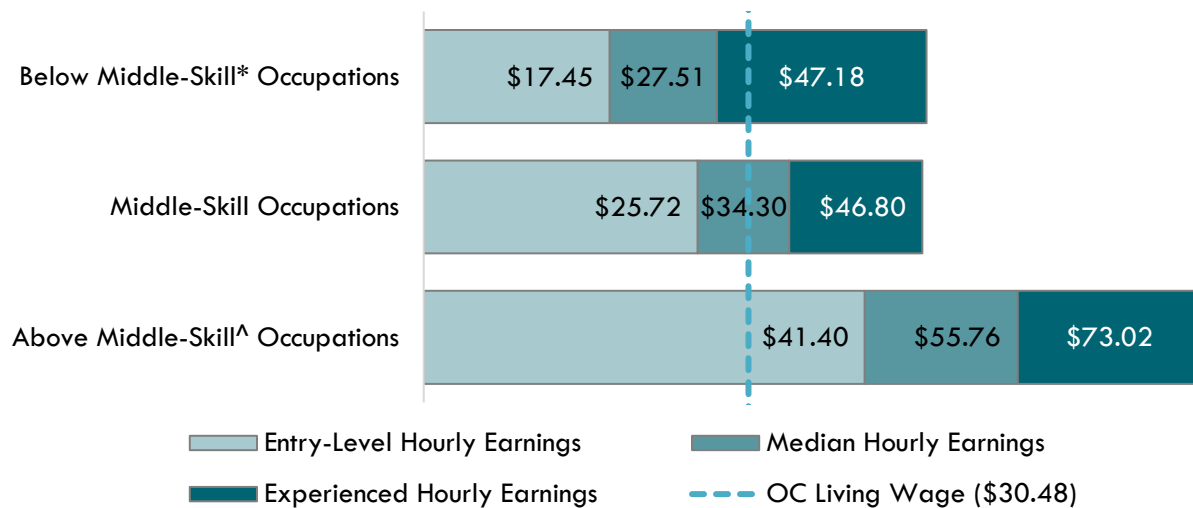


## Earnings

In Orange County, the MIT Living Wage for one adult is \$30.48 per hour, which is the floor benchmark for wages in the county. More than one-third of occupations, 18 (37%), have entry-level wages above Orange County’s living wage. However, entry-level wages across all 49 ICT/Digital Media sector occupations range from \$5.98 to \$62.26 per hour, with *Artists and Related Workers, All Other (27-1019)\** and *Computer and Information Systems Managers (11-3021)^#* at the lower- and upper-end of this range, respectively.

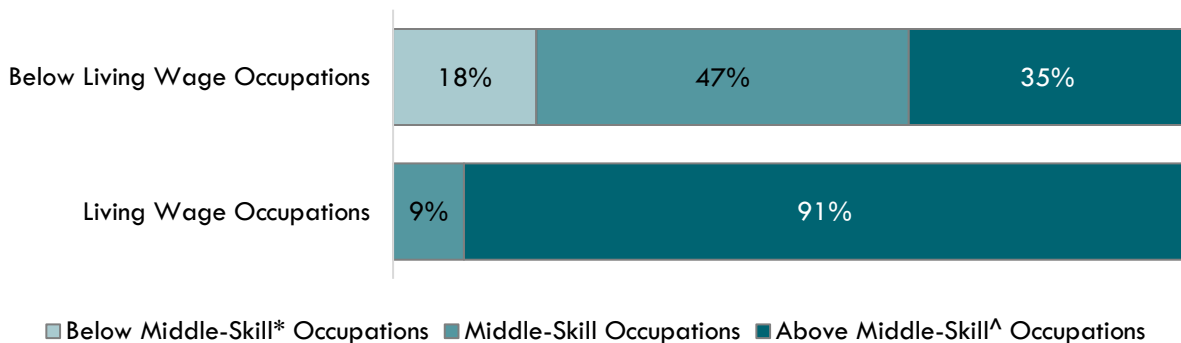
To better understand ICT/Digital Media sector wages in Orange County, wages are weighted by the number of 2022 jobs. This accounts for the variation in wages between occupations by using the number of jobs to normalize the wage data, such as large numbers of jobs with low wages, small number of jobs with high wages, or any combination of the two. Exhibit 8 shows the full spectrum of weighted wages (from entry-level to experienced) by skill level for the 49 ICT/Digital Media occupations ranging from below-middle-skill entry-level wages of \$17.45 to above middle-skill experienced wages of \$73.02.

**Exhibit 8: ICT/Digital Media Occupational Wages by Skill Level, Weighted by 2022 Jobs**



Notably, 53% of the annual job openings in this sector have entry-level wages above the living wage but the vast majority of openings are for above middle-skill occupations (91%). The distribution of annual openings for living wage jobs drastically varies by skill level with none for below middle-skill occupations and 9% for middle-skill occupations, as shown in Exhibit 9.

**Exhibit 9: Comparison of Living Wages by ICT/Digital Media Annual Openings and Skill Level**



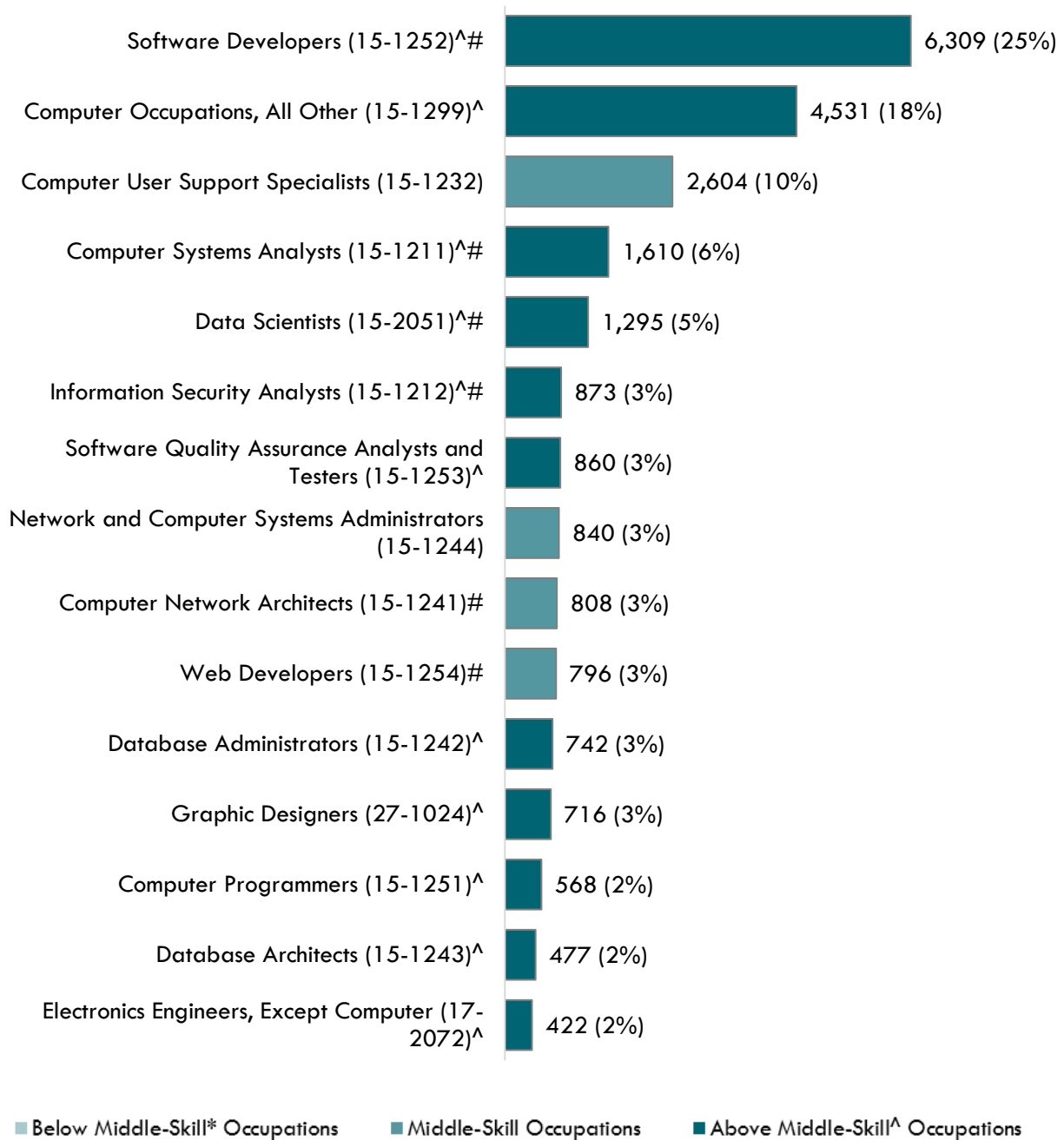


# JOB POSTINGS INFORMATION

## Job Postings in Orange County

Over the past 12 months (March 2023 – February 2024), there were 25,718 employer job postings within Orange County for all ICT/Digital Media occupations. Exhibit 10 shows the 15 occupations with the highest number of job postings, which represents approximately 91% of all job postings within the sector. Most notably, *Software Developers (15-1252)^#* make up a quarter of the job postings.

**Exhibit 10: Top 15 ICT/Digital Media Occupations by Number of Job Postings**



## Top Employers

Orange County’s ICT/Digital Media employers represent a wide range of industries, as shown in Exhibit 11. Employers with postings for below middle-skill occupations, such as Aimbridge Hospitality, Hyatt, and Disney, offer positions in hospitality and entertainment which are often seasonal or temporary. Employers with postings for middle-skill occupations, including Randstad, Robert Half, and Bowman Williams cater to diverse roles encompassing administrative, technical, and sales positions. These jobs generally require specific skills and/or certifications, often obtained through vocational training or associate degrees. Employers that posted jobs for above middle-skill occupations, such as Boeing and Deloitte, typically seek candidates with higher education levels and/or specialized technical expertise in fields like aerospace and technology. Notably, only the University of California, a system that offers a diverse range of employment opportunities from entry-level to higher-skilled positions within academia, appears across all tiers.

**Exhibit 11: Top 10 ICT/Digital Media Regional Employers with the Most Job Posting by Skill Level**

Below Middle-Skill*	Middle-Skill	Above Middle-Skill^
1. Aimbridge Hospitality	1. Randstad	1. Boeing
2. University of California	2. Ledgent	2. Anduril Industries
3. Disney	3. Boeing	3. Supernal
4. Creation Station Dance	4. TEKsystems	4. L3Harris Technologies
5. Hyatt	5. Robert Half	5. Motion Recruitment
6. Hoag Health System	6. Canteen Vending	6. University of California
7. City of La Habra	7. Bowman Williams	7. First American Financial
8. Cedar Fair	8. University of California	8. Deloitte
9. Chapman University	9. Best Buy	9. Randstad
10. Halo Staffing Group	10. Kforce	10. Actalent

## Top Job Titles

Below middle-skill job titles predominantly encompass roles requiring manual or entry-level technical skills such as Phone Operators, Dance Instructors, and Lighting Technicians, suggesting a focus on repetitive tasks or physical coordination. Middle-skill job titles consist of roles that require technical expertise but may not necessarily demand advanced degrees, including IT Support Specialists, Photographers, and Technical Support Specialists, reflecting a need for specialized knowledge and problem-solving abilities. Above middle-skill job titles incorporate professions with a higher degree of technical complexity and often require advanced education or specialized training, such as Software Engineers, Data Analysts, and Data Scientists, indicating a demand for advanced technical skills and analytical capabilities. Job titles by skill level are shown in Exhibit 12.

**Exhibit 12: Top 10 ICT/Digital Media Job Titles in Orange County by Skill Level**

Below Middle-Skill *	Middle-Skill	Above Middle-Skill^
1. Phone Operators	1. Network Engineers	1. Software Engineers
2. Telephone Operators	2. Systems Administrators	2. Graphic Designers
3. Communications Operators	3. Desktop Support Technicians	3. Systems Engineers
4. PBX Operators	4. IT Support Specialists	4. Data Analysts
5. Lighting Technicians	5. Audiovisual Technicians	5. Business Systems Analysts
6. Dance Instructors	6. Photographers	6. Data Engineers
7. Accompanists	7. IT Specialists	7. Embedded Software Engineers
8. Musicians	8. Help Desk Technicians	8. Software Developers <sup>#</sup>
9. Cast Members	9. Technical Support Specialists	9. DevOps Engineers
10. Sign Dancers	10. Help Desk Analysts	10. Data Scientists <sup>#</sup>

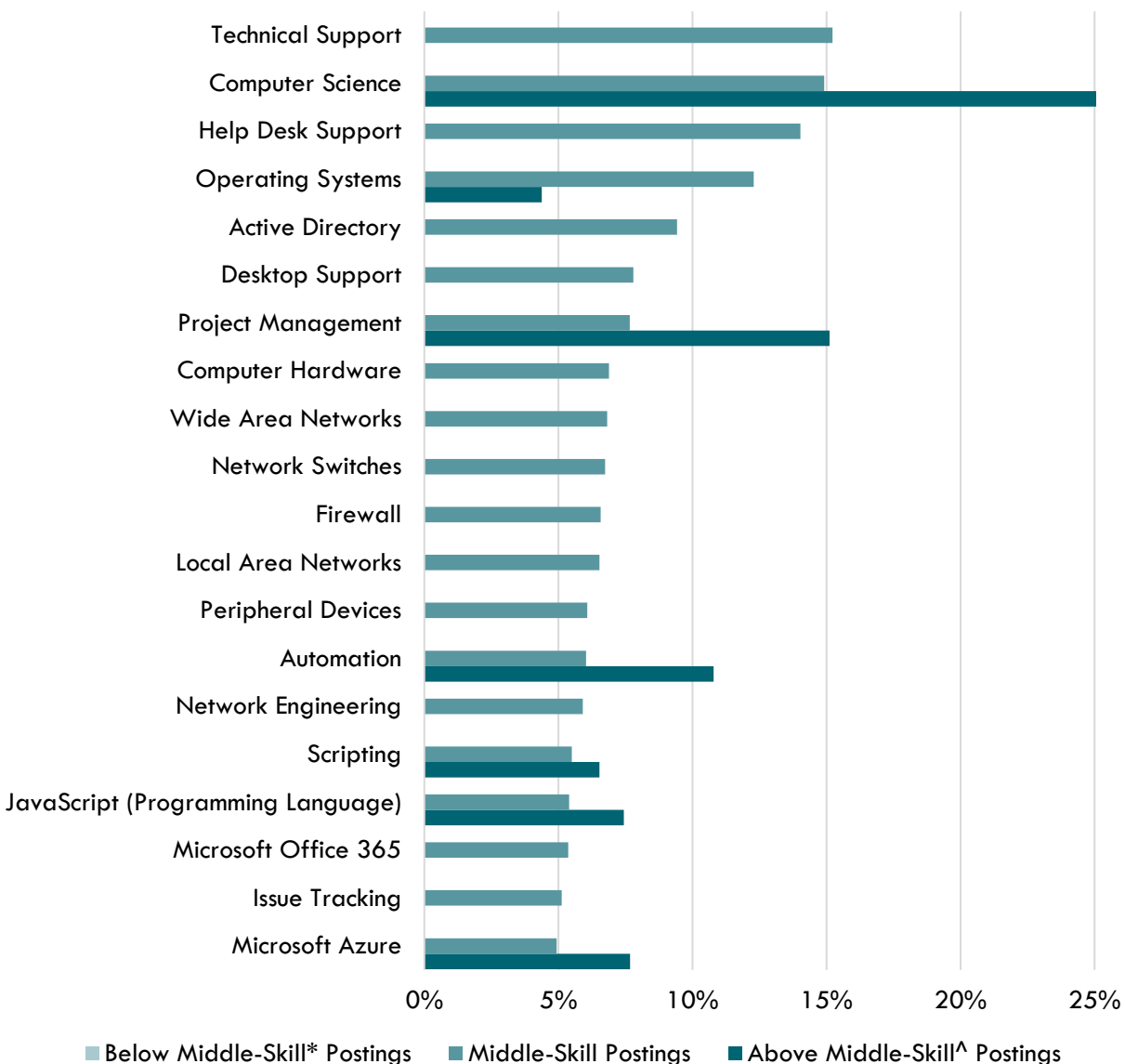
## Skills in Job Postings

There are three types of skills listed in job postings: specialized (“technical” or “hard”), common (“soft” or “human”), and computer skills.

### Top Specialized Skills

Among the 20 specialized skills listed in Exhibit 13, only seven are common to both above middle-skill and middle-skill occupations; there are no skills shared by below middle-skill occupations. Moreover, none of the skills are consistent across all skill levels. Skills such as project management and computer science show higher percentages in above and middle-skill postings, with 15% and 25% respectively, indicating their significance in jobs requiring more advanced expertise, such as *Software Developers (15-1252)^#*, *Computer Systems Analysts (15-1211)^#*, and *Data Scientists (15-2051)^#*. Conversely, technical support-related skills, such as help desk support, technical support, and desktop support are predominant in middle-skill occupations such as *Computer User Support Specialists (15-1232)*, *Network and Computer Systems Administrators (15-1244)*, and *Computer Network Support Specialists (15-1231)*.

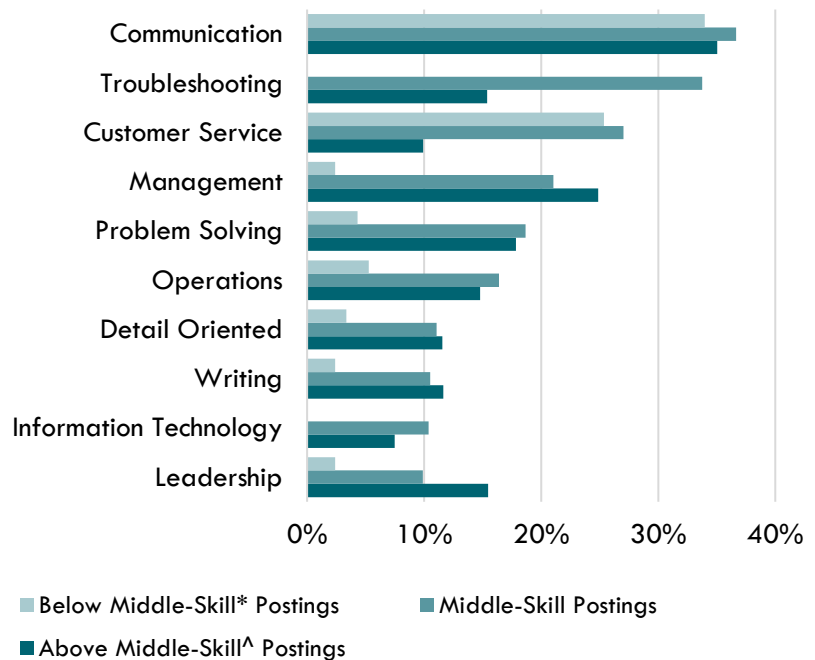
**Exhibit 13: Top 20 Specialized Skills in ICT/Digital Media Occupations**



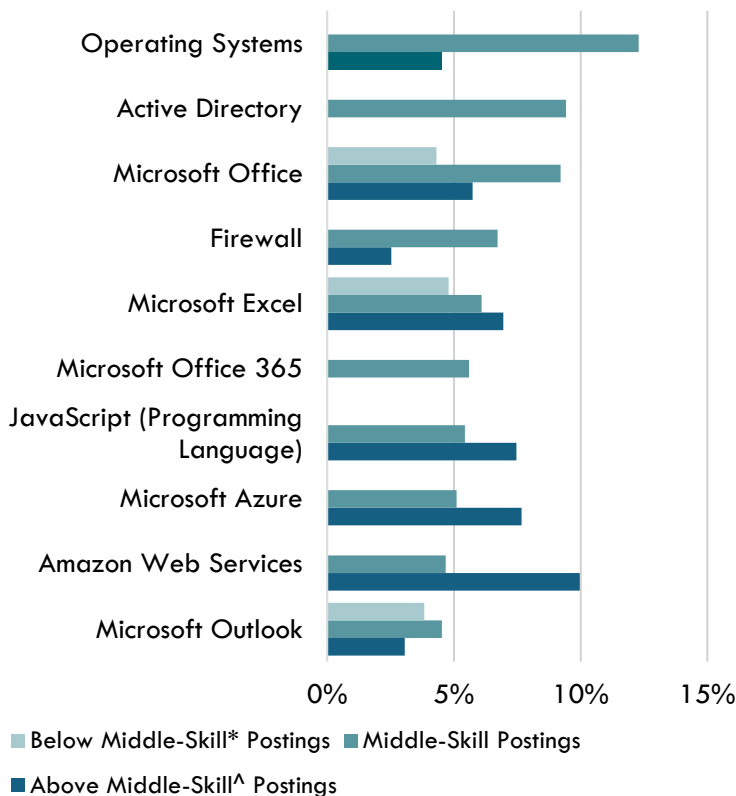
## Top Common Skills

Among the top 10 common skills listed in Exhibit 14, communication skills are the most valued across all skill levels with more than one-third of job postings listing them. Leadership (2%), management (2%), and problem-solving (4%) skills appear to be less prioritized in postings for below middle-skill postings compared to both middle-skill and above middle-skill postings. Management (25%), problem solving (18%), and leadership (15%) skills are highly valued in above middle-skill postings, while, other than communication, customer service (25%) skills are most requested in below middle-skill postings. Troubleshooting and information technology are the only two skills that do not appear in any below middle-skill postings.

**Exhibit 14: Top 10 Common Skills in ICT/Digital Media Occupations**



**Exhibit 15: Top 10 Computer Skills in ICT/Digital Media Occupations**



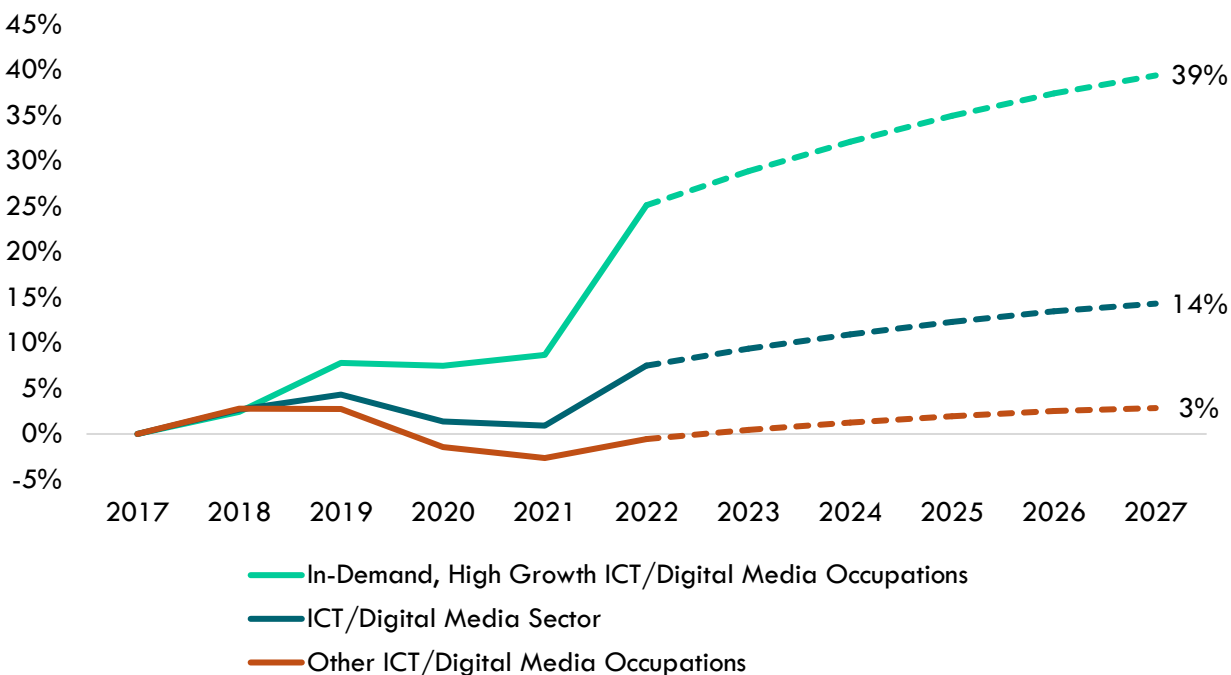
## Top Computer Skills

Among above middle-skill postings, Amazon Web Services and Microsoft Azure are the most sought-after computer skills, with 10% and 8% respectively, reflecting the increasing demand for cloud computing expertise. JavaScript and Microsoft Excel are also in demand at 7% each, showcasing the importance of programming and data analysis skills. Notably, Microsoft Office 365 and Active Directory show no demand for above middle-skill postings. In middle-skill postings, operating systems and Active Directory are the most desired at 9% and 12% respectively, indicating a need for foundational IT infrastructure skills. The only three skills that are represented in below middle-skill postings are Microsoft Office programs such as Excel and Outlook, as shown in Exhibit 15.

# KEY OCCUPATIONS DRIVING EMPLOYMENT

There are 11 ICT/Digital Media occupations, 22% of the total 49 occupations in the sector, that have a significant number of jobs and annual openings and are projected to have high growth through 2027. These 11 occupations are projected to drive employment with a projected 39% change from 2017 to 2027— more than double the growth of all occupations in the ICT/Digital Media sector, as shown in Exhibit 16.

**Exhibit 16: ICT/Digital Media Employment Change, 2017-2027**



The occupations driving employment in the ICT/Digital Media Sector can be grouped into three broad categories:

**Data Science and Information Security**

*Information Security Analysts (15-1212)^#  
Data Scientists (15-1252)^#*

**Software and Web Development**

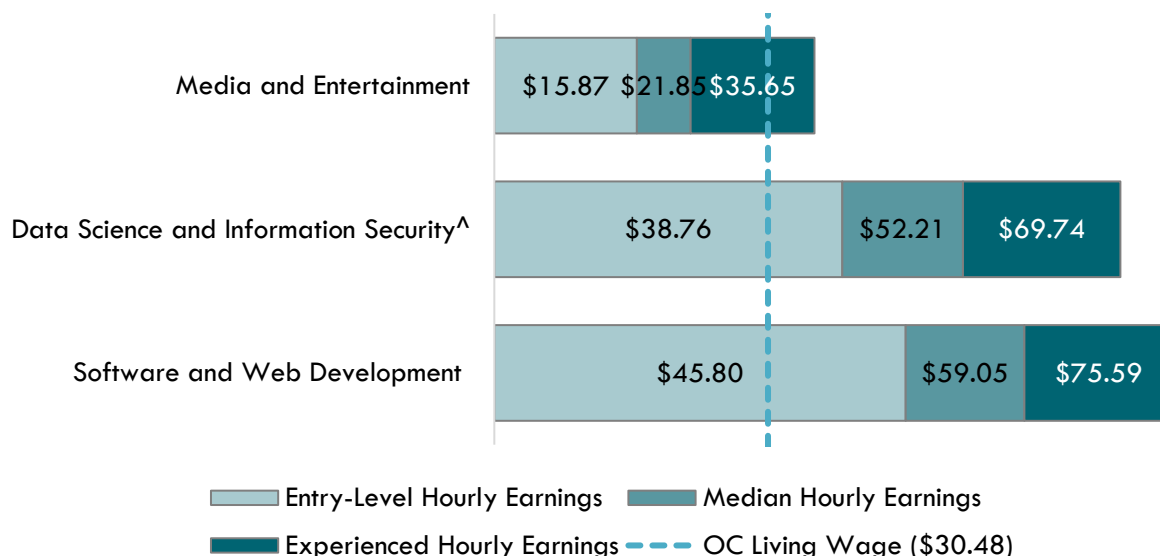
*Software Developers (15-1252)^#  
Software Quality Assurance Analysts and Testers (15-1253)^  
Web Developers (15-1254)#  
Web and Digital Interface Designers (15-1255)*

**Media and Entertainment**

*Actors (27-2011)  
Dancers (27-2031)\*  
Entertainers and Performers, Sports and Related Workers, All Other (27-2099)\*  
Audio and Video Technicians (27-4011)  
Photographers (27-4021)*

Though these occupations are projected to have high growth, wages vary greatly for each group, with the Media and Entertainment occupations having the lowest wages and Software and Web Development having the highest. Low wages for Media and Entertainment occupations are related to high percentages of part-time work and self-employment. These occupations also have low typical education requirements while Data Science and Information Security and Software and Web Development have high typical education requirements. Exhibit 17 shows the wage range for these three groups.

**Exhibit 17: Wages by Key ICT/Digital Media Occupation Group, Weighted by 2022 Jobs**



These three key occupation groups accounted for 40% of ICT/Digital Media online job postings over the past 12 months, as shown in Exhibit 18. The Software and Web Development group alone accounted for 30% of ICT/Digital Media online job postings.

**Exhibit 18: Number of Job Postings by Key ICT/Digital Media Occupation Group**

Key Occupation Group	Number of Postings	% of Total ICT/Digital Media Postings
Software and Web Development	8,180	30%
Data Science and Information Security <sup>^</sup>	2,167	8%
Media and Entertainment	670	3%
<b>Total</b>	<b>11,018</b>	<b>40%</b>

The skills requested by employers in online job postings also vary, with little overlap in the top 10 skills for each group, as shown in Exhibit 19.

### Exhibit 19: ICT/Digital Media Key Occupations Skills Analysis

An analysis of the top 10 skills requested in online job postings shows that there is no overlap in skills for all three groups of occupations. However, computer science, SQL, and Python are in the top 10 skills for the Data Science and Information Security and Software and Web Development groups. Project management is shared by the Data Science and Information Security and Media and Entertainment groups.

**Data Science and Information Security**

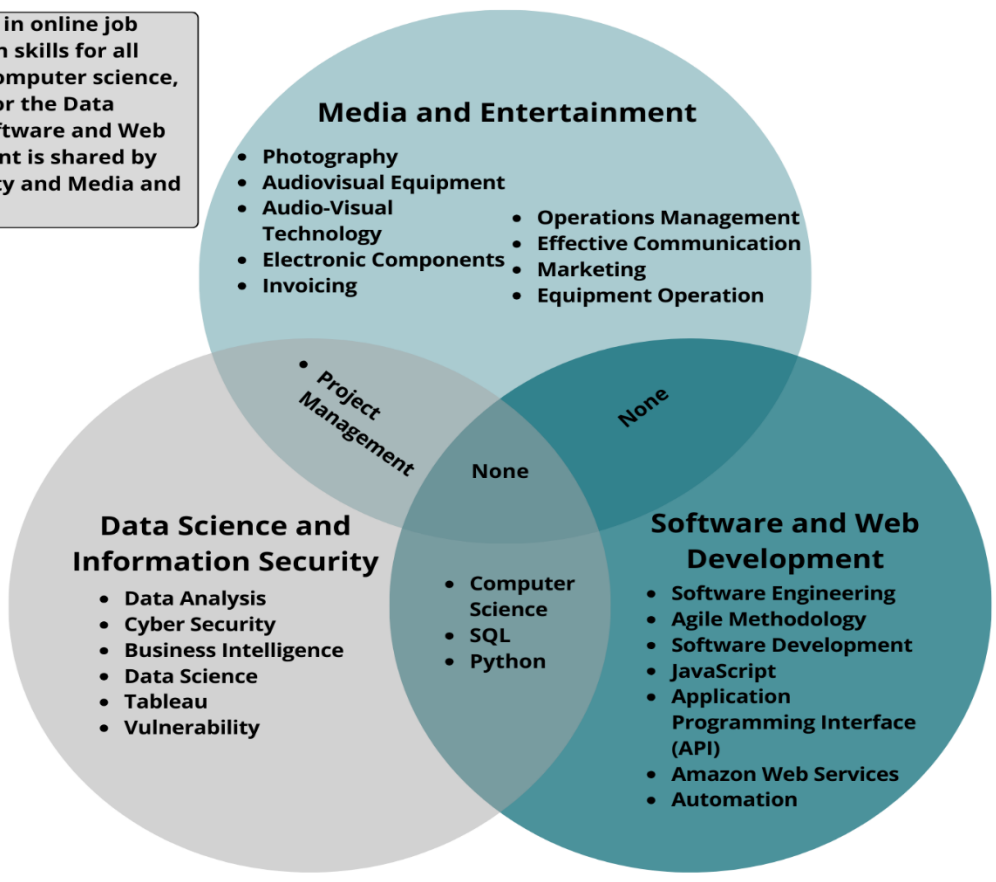
Employers requested data analysis and science skills for this group. Two programming languages, SQL and Python, overlap with the Software and Web Development group.

**Media and Entertainment**

The skills requested for this group revolve around audio and video equipment operation and maintenance.

**Software and Web Development**

Employers requested several different programming languages for this group, as well as knowledge of software principles and automation.



The following sections highlight trends, specific occupations, and examine emerging topics and areas for each of the three groups of key occupations driving employment in the ICT/Digital Media sector.

### Data Science and Information Security

There are two occupations in this group: *Information Security Analysts (15-1212)<sup>^#</sup>* and *Data Scientists (15-1252)<sup>^#</sup>*, both of which are above middle-skill. Notably, these are also the only two ICT/Digital Media occupations that were considered the “Best of the Best” in the OC Labor Market Overview. They underscore two rapidly developing fields: cybersecurity and data science.

### Cybersecurity

According to the federal National Institute of Standards and Technology’s Computer Security Resource Center, cybersecurity is the “prevention of damage to, protection of, and restoration of computers, electronic communications systems, electronic communications services, wire communication, and electronic communication, including information contained therein, to ensure its availability, integrity, authentication, confidentiality, and nonrepudiation.”<sup>7</sup>

- There are over 55,000 online job postings for cybersecurity roles in California and over 125,000 cybersecurity workers throughout the state.<sup>8</sup>
- Multiple studies have reported cybersecurity workforce shortages and noted that cybersecurity training programs are not adequately preparing students for critical skilled roles.

- The Center for Strategic & International Studies (CSIS) noted that hands-on experience for cybersecurity roles is greatly valued by employers and that “as many as 80 percent of hiring managers no longer believe a four-year degree adequately prepares students for cybersecurity jobs.”<sup>9</sup>
- CSIS recommended expanding work-based learning such as apprenticeships and internships to address cybersecurity shortages and provide students with more hands-on training.

## Data Science and Data Analytics

Data Scientists (15-1252)<sup>^#</sup> is one of the newest occupations to be added to the BLSs’ SOC system. Though the field of data science is still developing, there is general consensus regarding the distinction between data analysts and data scientists. Typically, a data analyst examines and analyzes data sets to identify trends and provide insights for strategic decision making while data scientists employ predictive analytics through machine learning models and other statistical methods to predict future trends using historical data.<sup>101112</sup>

- 87% of online job postings for Data Scientists<sup>^#</sup> requested a bachelor’s degree or higher.
- Training is provided by community colleges<sup>13</sup>, university credit and extension programs<sup>1415</sup>, and self-paced online platforms.<sup>1617</sup>

## Software and Web Development

This group includes *Software Developers (15-1252)<sup>^#</sup>*, *Software Quality Assurance Analysts and Testers (15-1253)<sup>^</sup>*, *Web Developers (15-1254)<sup>#</sup>*, and *Web and Digital Interface Designers (15-1255)*. All four of these occupations use programming languages to create apps, websites, and other interfaces that connect the physical and digital world; two of them are considered above middle-skill and two are middle-skill.

## Artificial Intelligence

According to IBM, “Artificial intelligence (AI) is a field, which combines computer science and robust datasets, to enable problem-solving.”<sup>18</sup> AI models are typically developed by *Software Developers (15-1252)<sup>^#</sup>*, who use programming languages such as Python and methods such as machine learning to analyze large amounts of data and create models that can optimize productivity, sales, maintenance, and more.<sup>19</sup>

- Top AI skills include data mining, programming, statistics, and big data.<sup>20</sup>
- 95% of online job postings for AI positions requested a bachelor’s, master’s, or doctoral degree.
- Nearly 13% of workers were employed at firms that utilized AI between 2016 and 2018 with that figure projected to increase.<sup>21</sup>





## Programming Languages

The four occupations that comprise the Software and Web Development key occupation group all utilize various computer programming languages; some overlap while others are occupation-specific.

An analysis of online job postings for these four occupations shows that there are at least seven distinct programming languages requested by employers, as shown in Exhibit 20.

**Exhibit 20: Percentage of Online Job Postings for Software and Web Development Occupations by Programming Language**

Programming Language	Software Developers <sup>^#</sup>	Software Quality Assurance Analysts and Testers <sup>^</sup>	Web and Digital Interface Designers	Web Developers <sup>#</sup>
C#	15%	-	-	-
C++	14%	-	7%	-
HTML	-	-	-	29%
Java	14%	9%	-	-
JavaScript	16%	-	-	38%
Python	18%	22%	6%	-
SQL	21%	12%	-	-

Of the over 39,000 online job postings for these programming languages across all occupations and sectors, 95% (26,414) requested a bachelor's, master's, or doctoral degree.

## Media and Entertainment

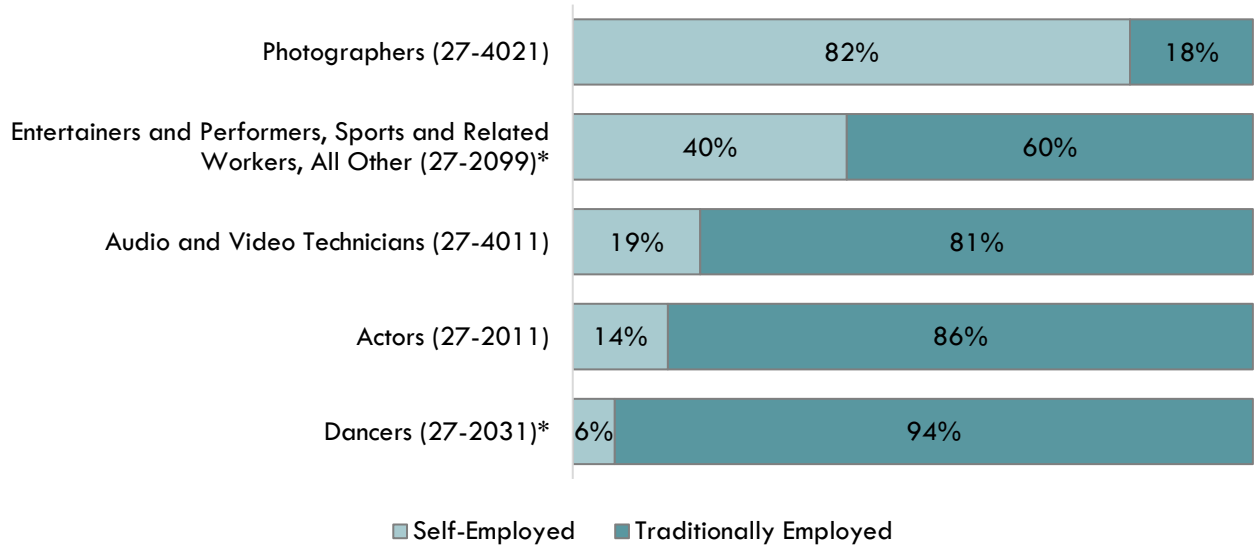
This group includes *Actors (27-2011)*, *Dancers (27-2031)\**, *Entertainers and Performers, Sports and Related Workers, All Other (27-2099)\**, *Audio and Video Technicians (27-4011)*, and *Photographers (27-4021)*, two of which are considered below middle-skill occupations. In Orange County, these occupations are mainly hired by Amusement and Theme Parks (such as Disneyland in Anaheim) as well as Theater Companies and Dinner Theaters (such as Medieval Times in Buena Park), as opposed to Los Angeles, where they are typically associated with the Hollywood entertainment industry.

Earnings and work-week dynamics differ for these occupations relative to their counterparts across other sectors.

- These occupations tend to have the lowest wages in the ICT/Digital Media sector.
- 84% of Actors and 63% of Dancers\* work less than 40 hours per week, on average.
- Lack of full-time work may preclude workers from benefits, such as employer-sponsored health coverage, that typically require full-time employment.
- Audio and Video Technicians have the highest entry-level wages in this group.
- A significant percentage of workers in these occupations are self-employed.
- Photographers have the highest level of self-employment (82%) and worked the most hours, with 48% working more than 40 hours per week, on average.
- Students in Entertainment and Media programs would likely benefit from business and entrepreneurship courses to better understand the business side of self-employment.

Exhibit 21 shows the percentage of self-employed workers for this group of occupations.

**Exhibit 21: Percentage of Self-Employed Workers for Entertainment and Media Occupations**



# ICT/DIGITAL MEDIA SUPPLY

Orange County’s educational institutions provide programs tailored to equip students with skills suited for different levels of occupations within the ICT/Digital Media sector. The following visuals outline the number of awards conferred by both community colleges and non-community colleges, program observations from COCI<sup>22</sup>, as well as the regional programs and institutions that have conferred the most awards.



**1,521**

community college awards



**2,215**

non-community college awards



**3,736**

total awards conferred

## COCI Observations

- There are 236 unique ICT/Digital Media programs, the 2nd most of any sector, offered by Orange County community colleges.
- Digital Media accounts for 60% of programs compared to ICT’s 40%.
- 66% of programs are for Certificates of Achievement.
- 29% are for Associate (and transfer) Degrees, and 4% are for noncredit awards.
- Fullerton offers the most ICT/Digital Media Programs (47), followed by Orange Coast (42), then Cypress and Saddleback (35 each).

## Top Program Awards

**Community College:**  
 Computer Programming: 242  
 Computer Networking: 209  
 Television: 133  
 Radio and Television: 119  
 Computer Infrastructure and Support: 118

**Non Community College:**  
 Computer Science: 1,350  
 Cinematography and Film/Video Production: 217  
 Radio and Television: 169  
 Information Technology: 85  
 Music Performance: 70

## Most Awards

**Community College:**  
 Orange Coast: 351  
 Saddleback: 299  
 Fullerton: 188  
 Coastline: 178  
 Santa Ana: 177

**Non Community College:**  
 University of California-Irvine: 947  
 California State University-Fullerton: 654  
 Chapman University: 360  
 Laguna College of Art and Design: 95  
 University of Massachusetts Global: 53

## Community College Student Outcomes

Orange County community college students account for 10% of all ICT/Digital Media community college students in California. The visuals below show the Strong Workforce Program (SWP) metrics for the ICT/Digital Media sector in Orange County.<sup>23</sup>



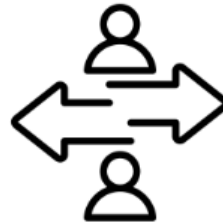
**21,333**

SWP Students  
(2021-22)



**981**

SWP Students Who  
Earned a Degree or  
Certificate or Attained  
Apprenticeship Journey  
Status (2021-22)



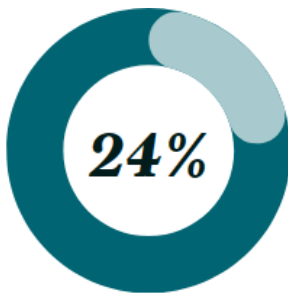
**2,223**

SWP Students Who  
Transferred to a Four-  
Year Postsecondary  
Institution (2019-20)

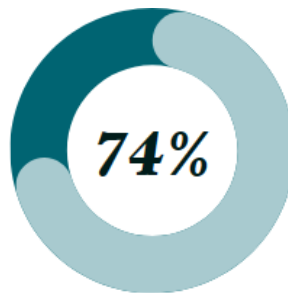


**\$37,950**

Median Annual  
Earnings for SWP  
Exiting Students  
(2020-21)



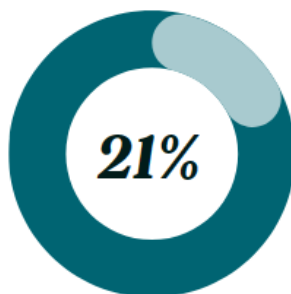
SWP Students Who  
Earned 9 or More  
Career Education Units  
in the District in a  
single Year (2021-22)



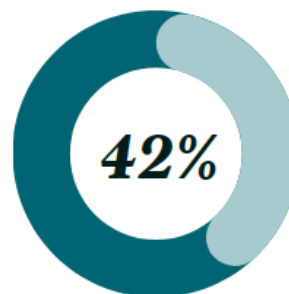
SWP Students Who  
Completed a Noncredit  
CTE or Workforce  
Preparation Course  
(2021-22)



SWP Students with  
a Job Closely  
Related to Their  
Field of Study  
(2019-20)



Median Change (Gain)  
in Earnings for SWP  
Exiting Students  
(2020-21)



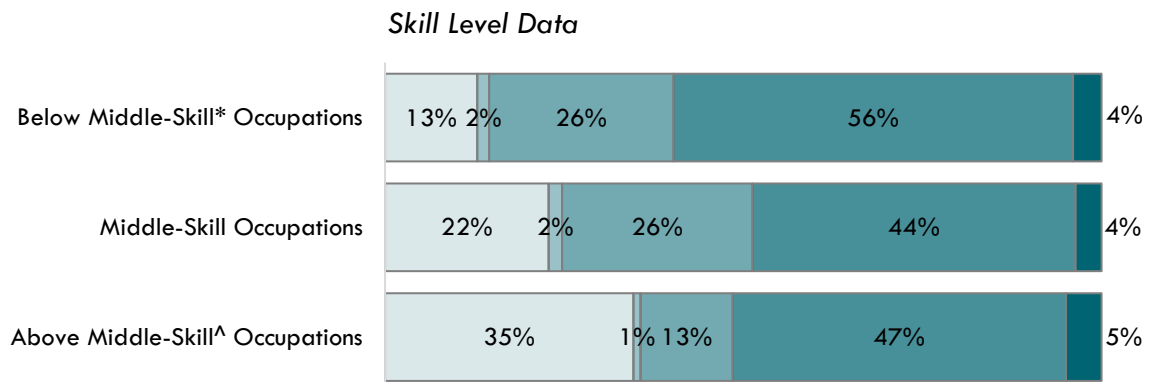
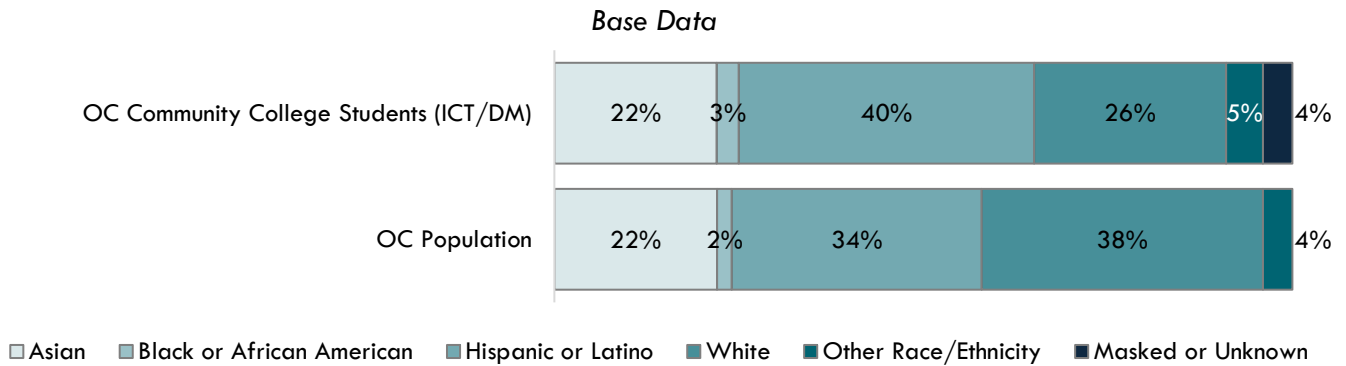
SWP Exiting Students Who  
Attained the Living Wage  
(2020-21)

# DEMOGRAPHICS

## Ethnicity

Exhibit 22 shows the ethnicity of Orange County community college students enrolled in ICT/Digital Media programs compared to the overall Orange County population and the three skill-level occupational groups. Notably, 40% of ICT/Digital Media students are Hispanic or Latino, which is higher than the population (34%), and significantly higher than workers in above middle-skill occupations (13%). Conversely, 47% of workers in these above middle-skill occupations are white, which is higher than the population (38%), but nearly double community college ICT/Digital Media students (26%).

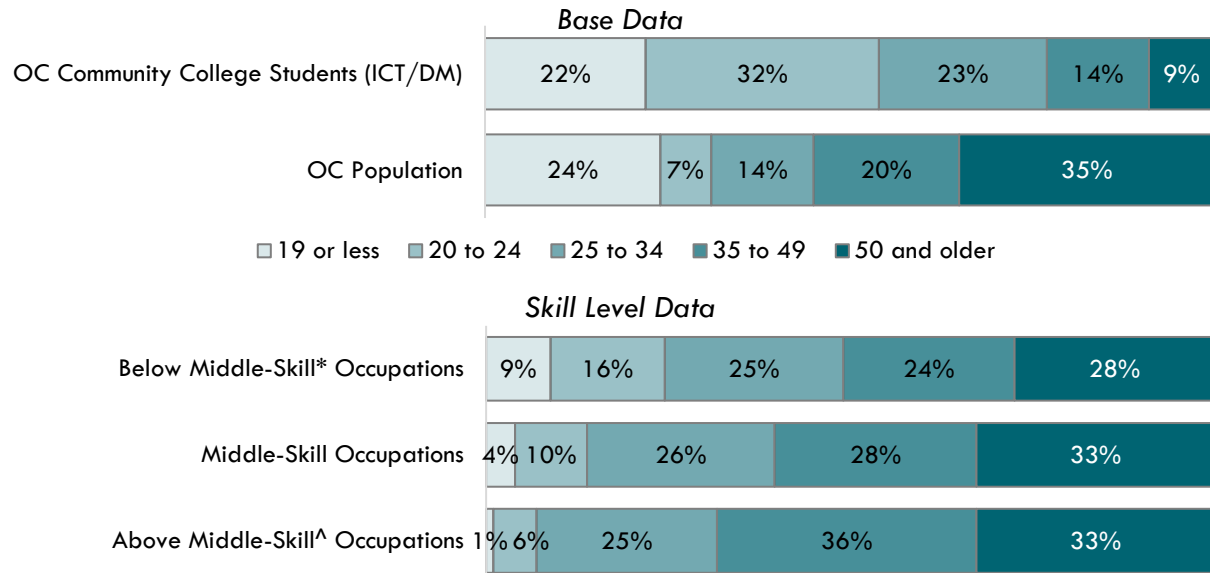
**Exhibit 22: ICT/Digital Media Sector Demographics by Ethnicity**



## Age Group

Exhibit 23 shows the age of Orange County community college students enrolled in ICT/Digital Media programs compared to the overall Orange County population and the three skill-level occupational groups. More than two-thirds (69%) of workers in the above middle-skill occupations are 35 and older, which is higher than the population (55%) and community college ICT/Digital Media students (23%). Most middle-skill (33%) and below middle-skill (28%) workers are 50 and older.

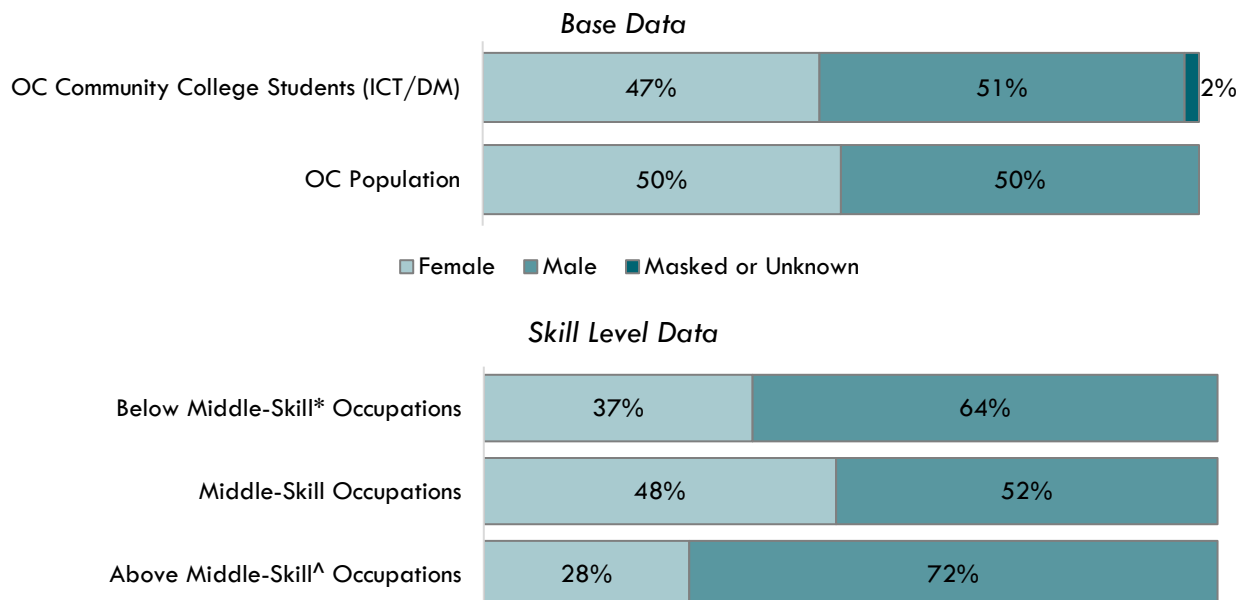
**Exhibit 23: ICT/Digital Media Sector Demographics by Age Group**



## Sex

Exhibit 24 shows the sex of Orange County community college students enrolled in ICT/Digital Media programs compared to the overall Orange County population and the three skill-level occupational groups. Though the population is split evenly, 51% of ICT/Digital Media students and between 52% to 72% of workers in these occupations are men.

**Exhibit 24: ICT/Digital Media Sector Demographics by Sex**



## PUBLIC POLICY AND FUNDING OPPORTUNITIES

In 2022, the federal government enacted the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act (henceforth, “the Act”), allocating \$250 billion towards STEM and workforce development initiatives over 10 years. This came at a time when the sector was experiencing ongoing labor challenges as it sought to fill roles requiring four-year or advanced degrees and skilled technician positions requiring an associate degree or less but with qualified training.<sup>24</sup> Funding opportunities through the Act continue to be made available through initiatives such as the CHIPS Program Office of the U.S. Department of Commerce.<sup>25</sup> Due to the Act’s relatively recent enactment, implementation and disbursement efforts continue to be carried out.

Several federal and state financial initiatives are available for further investment into the ICT/Digital Media sector. While not an exhaustive list, the following provides a sample of available sector-specific funding opportunities:

- **California Competes Tax Credit (CCTC):** This program provides tax credits to businesses that want to come to California or remain and grow in the state.<sup>26</sup> Incentivizes companies, including those in the IT sector, to create jobs and invest in California.
- **California Film & Television Tax Credit:** In addition to providing financial incentives to boost production within the state, the California Film & Television Tax Credit Program 3.0 includes provisions mandating documented policies for addressing harassment and the launch of “a pilot skills training program designed to facilitate access to career opportunities for individuals from underserved communities.”<sup>27</sup> Program 3.0 will sunset on June 30, 2025 and will be followed by Program 4.0 beginning July 1, 2025. The latter is expected to generate 60,000 jobs and draw in \$10 billion in investments and includes provisions on workforce diversity, funding towards the Career Pathways Training Program, and the launch of the Safety on Production Program, the first of its kind in the U.S.<sup>28</sup>
- **California Advanced Services Fund (CASF):** This fund supports the deployment of broadband infrastructure in underserved and unserved areas of California. By expanding access to high-speed internet, the CASF helps create opportunities for IT-related businesses and jobs in these communities.
- **Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs:** These programs “support scientific excellence and technological innovation through the investment of Federal research funds in critical American priorities to build a strong national economy”<sup>29</sup>.
- **Clean Diesel Emerging Technologies Program:** This program creates a pathway for the development of technologies that would diminish emissions of currently used heavy-duty diesel engines.<sup>30</sup>

# APPENDIX A: METHODOLOGY

## Traditional Labor Market Data Methodology

The COE analyzed traditional labor market demand information, which includes job counts, projections, wages, typical education requirements, for the ICT/Digital Media sector. Traditional labor market demand data was sourced from Lightcast (Datarun 2023.4), a labor market analytics firm that aggregates data from public statistical agencies including the Bureau of Labor Statistics, Census Bureau, and the California Employment Development Department. Living wage data was sourced from the Insight Center California Family Needs Calculator.<sup>31</sup> The traditional labor market demand data analyzed in this report includes:

- **2022 Jobs:** the number of jobs by industry and occupation in 2022.
- **2027 Jobs:** the projected number of jobs by industry and occupation in 2027. Projections are based on the assumption that past trends will continue into the future, including the assumption that the economy, during the projection period, will be at approximately full employment. Projections do not consider potential recessions or labor shocks, such as natural disasters or pandemics, and are intended to capture structural change in the economy over time.
- **Change:** the projected change in the number of jobs, expressed as an actual number and a percentage.
- **Average Annual Openings (Demand):** the projected number of annual job openings. This figure is the sum of job growth and replacement jobs. Job growth is the result of job creation while replacement jobs are the result of retirements and workers leaving the filled, creating the need to hire a replacement.
- **Hourly Wages:**
  - **Entry-level (25<sup>th</sup> percentile):** the typical entry-level wages for an occupation; 25% of workers earn less than this amount and 75% earn more.
  - **Median:** the median wages for an occupation; 50% of workers earn less than this amount and 50% earn more.
  - **Experienced (75<sup>th</sup> percentile):** the typical experienced-level wages for an occupation; 75% of workers earn less than this amount and 25% earn more.
- **Typical Entry-Level Education:** represents the typical education level needed to enter an occupation.
- **Educational Attainment:** the percentage of workers employed in an occupation by their highest level of education attained.

Demographic data for the Orange County population comes from the Census Bureau's American Community Survey (5-Year Estimates, 2018-2022). Demographic data for occupations was sourced via IPUMS USA and student demographic data was sourced from the LaunchBoard Community College Pipeline (2020-21 Academic Year).<sup>32,33</sup>

The COE also analyzed labor market supply data that is calculated using the number of awards conferred in related training programs at community college and non-community college institutions over the past three years of available data. Community college data is sourced from the California Community College Chancellor's Office Data Mart<sup>34</sup> and includes the years 2020-2023; non-community college data is sourced from the Integrated Postsecondary Education Data System and includes the years 2019-2022.<sup>35</sup>

## Job Postings Analysis Methodology

In addition to traditional labor market information, the COE analyzed real-time labor market information using online job postings data sourced from Lightcast (Datarun 2024.1). The job postings data in this report covers the last 12 months of available data (March 2023 – February 2024). This data is derived from online job postings that are parsed and classified into industry and occupational groups using natural language processing (NLP) to determine the related company, industry, occupation, and other information for each job posting. Online job postings do not equate to labor market demand or replace traditional labor market data. They should only be considered a supplement to traditional LMI.



## APPENDIX B: SECTOR OCCUPATIONS AND TOP CODES

SOC	Occupation	TOP Code	Program Name
27-1019	Artists and Related Workers, All Other*	0602.00	Journalism
27-2031	Dancers*	0604.00	Radio and Television
27-2042	Musicians and Singers*	0604.10	Radio
27-2091	Disc Jockeys, Except Radio*	0604.20	Television (including combined TV/film/video)
27-2099	Entertainers and Performers, Sports and Related Workers, All Other*	0604.30	Broadcast Journalism
27-3099	Media and Communication Workers, All Other*	0607.00	Technical Communication
27-4015	Lighting Technicians*	0610.00	Mass Communications
27-4099	Media and Communication Equipment Workers, All Other*	0612.20	Film Production
39-3092	Costume Attendants*	0614.00	Digital Media
43-2021	Telephone Operators*	0614.10	Multimedia
43-2099	Communications Equipment Operators, All Other*	0614.20	Electronic Game Design
15-1231	Computer Network Support Specialists	0614.30	Website Design and Development
15-1232	Computer User Support Specialists	0614.40	Animation
15-1241	Computer Network Architects <sup>#</sup>	0614.50	Desktop Publishing
15-1244	Network and Computer Systems Administrators	0614.60	Computer Graphics and Digital Imagery
15-1254	Web Developers <sup>#</sup>	0699.00	Other Media and Communications
15-1255	Web and Digital Interface Designers	0701.00	Information Technology, General
27-2011	Actors	0702.00	Computer Information Systems
27-2032	Choreographers <sup>#</sup>	0702.10	Software Applications
27-4011	Audio and Video Technicians	0707.00	Computer Software Development
27-4012	Broadcast Technicians	0707.10	Computer Programming
27-4014	Sound Engineering Technicians	0707.20	Database Design and Administration
27-4021	Photographers	0707.30	Computer Systems Analysis
43-9031	Desktop Publishers	0708.00	Computer Infrastructure and Support
49-9061	Camera and Photographic Equipment Repairers	0708.10	Computer Networking
11-3021	Computer and Information Systems Managers <sup>^#</sup>	0708.20	Computer Support
15-1211	Computer Systems Analysts <sup>^#</sup>	0709.00	World Wide Web Administration
15-1212	Information Security Analysts <sup>^#</sup>	0709.10	E-Commerce (technology emphasis)
15-1221	Computer and Information Research Scientists <sup>^</sup>	0799.00	Other Information Technology
15-1242	Database Administrators <sup>^</sup>	0934.30	Telecommunications Technology
15-1243	Database Architects <sup>^</sup>	1005.00	Commercial Music
15-1251	Computer Programmers <sup>^</sup>	1012.00	Applied Photography
15-1252	Software Developers <sup>^#</sup>	1013.00	Commercial Art
15-1253	Software Quality Assurance Analysts and Testers <sup>^</sup>	1030.00	Graphic Art and Design
15-1299	Computer Occupations, All Other <sup>^</sup>	2206.10	Geographic Information Systems
15-2051	Data Scientists <sup>^#</sup>		
17-1021	Cartographers and Photogrammetrists <sup>^#</sup>		
17-2072	Electronics Engineers, Except Computer <sup>^</sup>		
27-1011	Art Directors <sup>^#</sup>		
27-1014	Special Effects Artists and Animators <sup>^</sup>		
27-1024	Graphic Designers <sup>^</sup>		
27-1027	Set and Exhibit Designers <sup>^</sup>		
27-2012	Producers and Directors <sup>^</sup>		
27-2041	Music Directors and Composers <sup>^</sup>		
27-3011	Broadcast Announcers and Radio Disc Jockeys <sup>^</sup>		
27-3023	News Analysts, Reporters, and Journalists <sup>^</sup>		
27-4031	Camera Operators, Television, Video, and Film <sup>^</sup>		
27-4032	Film and Video Editors <sup>^</sup>		
43-9081	Proofreaders and Copy Markers <sup>^</sup>		

■ Below Middle-Skill\* Occupations

■ Middle-Skill Occupations

■ Above Middle-Skill<sup>^</sup> Occupations

## APPENDIX C: END NOTES

- <sup>1</sup> "OC Sector Profile Supplemental Appendices: Information and Communication Technologies and Digital Media (ICT/DM)," Orange County Center of Excellence for Labor Market Research, last modified July 11, 2024, <https://coeccc.net/orange-county/2024/07/oc-sector-profile-supplemental-appendices-information-and-communication-technologies-ict-digital-media/>.
- <sup>2</sup> "Orange County Labor Market Overview," Orange County Center of Excellence for Labor Market Research, last modified November 16, 2023, <https://coeccc.net/orange-county/2023/11/orange-county-labor-market-overview/>.
- <sup>3</sup> "100 Best Jobs of 2024," U.S. News & World Report, accessed May 7, 2024, <https://money.usnews.com/careers/best-jobs/rankings/the-100-best-jobs>.
- <sup>4</sup> Allison Shrivastava, "February 2024 US Labor Market Update: Tech Jobs May Be Below Pre-Pandemic Levels, but In-Person Sectors Holding Steady," Indeed Hiring Lab, last modified March 1, 2024, <https://www.hiringlab.org/2024/02/20/labor-market-update-tech-jobs-below-pre-pandemic-levels/>.
- <sup>5</sup> Levi Sumagaysay, "Tech Boom Has Slowed, but There Are Still More Silicon Valley Jobs Than Before the Pandemic," CalMatters, last modified February 28, 2024, <https://calmatters.org/economy/2024/02/silicon-valley-jobs-report/>.
- <sup>6</sup> MIT Living Wage for Orange County, CA, accessed February 14, 2024, <https://livingwage.mit.edu/counties/06059>.
- <sup>7</sup> "Cybersecurity - Glossary | CSRC," NIST Computer Security Resource Center | CSRC, accessed March 22, 2024, <https://csrc.nist.gov/glossary/term/cybersecurity>.
- <sup>8</sup> "Cybersecurity Supply And Demand Heat Map," Cyberseek, accessed March 22, 2024, <https://www.cyberseek.org/heatmap.html>.
- <sup>9</sup> James Andrew Lewis and William Crumpler, "The Cybersecurity Workforce Gap," CSIS | Center for Strategic and International Studies, last modified January 29, 2019, <https://www.csis.org/analysis/cybersecurity-workforce-gap>.
- <sup>10</sup> Indeed Editorial Team, "How To Become a Data Scientist (With Skills and Salary)," Indeed Career Guide, last modified November 1, 2023, <https://www.indeed.com/career-advice/career-development/how-to-become-a-data-scientist>.
- <sup>11</sup> "Data Analyst Vs. Data Scientist: What's the Difference?," Coursera, last modified February 5, 2024, <https://www.coursera.org/articles/data-analyst-vs-data-scientist-whats-the-difference>.
- <sup>12</sup> Kristin Burnham, "Data Analytics Vs. Data Science: A Breakdown," Graduate Blog, last modified December 8, 2021, <https://graduate.northeastern.edu/resources/data-analytics-vs-data-science/>.
- <sup>13</sup> "New Two-Year College Data Science, Analytics Programs on the Rise," Amstat News | Monthly Membership Magazine of the American Statistical Association, last modified October 3, 2022, <https://magazine.amstat.org/blog/2022/08/01/new-two-year-programs/>.
- <sup>14</sup> "Learn Data Analytics," UC Irvine Boot Camps, last modified October 18, 2022, <https://bootcamp.ce.uci.edu/data/landing/>.
- <sup>15</sup> "Data Science," UCLA Extension, accessed March 22, 2024, <https://www.uclaextension.edu/digital-technology/data-analytics-management/certificate/data-science>.
- <sup>16</sup> "Best Data Science Courses Online with Certificates [2024]," Coursera, accessed March 22, 2024, <https://www.coursera.org/courses?query=data%20science&topic=data%20science>.
- <sup>17</sup> DataCamp, accessed March 22, 2024, <https://www.datacamp.com/>.
- <sup>18</sup> "What is Artificial Intelligence (AI)?" IBM - United States, accessed August 2, 2023, <https://www.ibm.com/topics/artificial-intelligence>.
- <sup>19</sup> "What is AI?," McKinsey & Company, last modified April 24, 2023, <https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-ai>.
- <sup>20</sup> Amit Verma, Kamal Lamsal, and Payal Verma, "An investigation of skill requirements in artificial intelligence and machine learning job advertisements," *Industry and Higher Education* 36, no. 1 (2021). doi:10.1177/0950422221990990.

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- 21 "The Impact of Artificial Intelligence on the Future of Workforces in the European Union and the United States of America," The White House, accessed August 2, 2023, <https://www.whitehouse.gov/wp-content/uploads/2022/12/TTC-EC-CEA-AI-Report-12052022-1.pdf>.
- 22 California Community College Chancellor's Office, n.d. <https://coci2.ccctechcenter.org/programs>.
- 23 All SWP metrics are for 2021-2022 unless otherwise noted.
- 24 Martha Ross and Mark Muro, "How Federal, State, and Local Leaders Can Leverage the CHIPS and Science Act As a Landmark Workforce Opportunity," Brookings, last modified January 31, 2024, <https://www.brookings.edu/articles/how-federal-state-and-local-leaders-can-leverage-the-chips-and-science-act-as-a-landmark-workforce-opportunity/>.
- 25 "CHIPS for America Fact Sheet," National Institute of Standards and Technology, last modified September 29, 2023, <https://www.nist.gov/system/files/documents/2023/09/29/Notice%20of%20Funding%20Opportunity%20Small-Scale%20Supplier%20Projects%20Fact%20Sheet.pdf>.
- 26 "California Competes," Governor's Office of Business and Economic Development, accessed March 25, 2024, <https://business.ca.gov/california-competes-tax-credit/>.
- 27 "California's Film & Television Tax Credit Program Attracts Biggest Blockbuster in Program History, Adding \$166 Million to State's Economy," California Governor's Office of Business and Economic Development (GO-Biz), last modified February 26, 2024, <https://business.ca.gov/californias-film-television-tax-credit-program-attracts-biggest-blockbuster-in-program-history-adding-166-million-to-states-economy/>.
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- 30 "Technology Advancement Funding Opportunities," US EPA, last modified January 31, 2024, <https://www.epa.gov/cati/technology-advancement-funding-opportunities#fed>.
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- 32 "Cal-PASS Plus - Community-College-Pipeline," Cal-PASS Plus, n.d. <https://www.calpassplus.org/LaunchBoard/Community-College-Pipeline.aspx>.
- 33 Steven Ruggles, Sarah Flood, Matthew Sobek, Daniel Backman, Annie Chen, Grace Cooper, Stephanie Richards, Renae Rodgers, and Megan Schouweiler. IPUMS USA: Version 15.0 [American Community Survey 2017-2021 5-Year Sample]. Minneapolis, MN: IPUMS, 2024. <https://doi.org/10.18128/D010.V15.0>
- 34 California Community Colleges Chancellor's Office - Data Mart, n.d. <https://datamart.cccco.edu/>.
- 35 "The Integrated Postsecondary Education Data System," National Center for Education Statistics (NCES), n.d. <https://nces.ed.gov/ipeds/>.



### Important Disclaimers

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. This study examines the most recent data available at the time of the analysis; 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 the report 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.

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FOR LABOR MARKET RESEARCH

**ORANGE COUNTY**

**ORANGE COUNTY  
REGIONAL CONSORTIUM**

**WORKFORCE  
DEVELOPMENT ALLIANCE**



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Colleges