Program Endorsement Brief:

American River College: Computer Software Development

North/Far North Center of Excellence, April 2019

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INTRODUCTION

American River College is examining an existing Computer Software Development program. The program intends to provide a certificate for students seeking jobs in the fields of mobile application development. The certificate's curriculum focuses on providing students with the necessary skills and aptitudes for designing, developing, and testing a variety of application program for mobile devices.

This report provides an overview of the labor market demand and supply for related software developer occupations. It provides an overview of the employment opportunities and existing community college programs that prepare students for the profession.

Key findings include:

- Historically, occupational demand for Computer Programmers, Software Developers (Applications and Systems Software), and Web Developers declined by 3.4 percent in the Greater Sacramento region, while demand for the same occupations throughout the state rose by almost 38 percent.
- Demand for these occupations is projected to increase in Greater Sacramento, and significantly rise across the state.
- Over the last decade, the Greater Sacramento region saw a decrease in demand for Computer Programmers and a large increase in demand for Software Developers, Applications. Demand is expected to continue to increase.
- Median hourly wages for software development jobs are generally above the Sacramento county living wage for one adult and one child at $26.48 per hour.

Findings in this report were determined using labor market data from the Bureau of Labor Statistics (BLS), U.S. Census Bureau data from Emsi and job posting data from Burning Glass.

The report contains the following sections:
- Occupational demand,
- Wages and job postings,
- Educational attainment and supply, and
- Findings and recommendations.

OCCUPATIONAL DEMAND

Four Standard Occupational Classification (SOC) codes related to the program are included in this analysis. Exhibit 1 summarizes job trends per the SOC codes in the 7-county Greater Sacramento region, the 22-county North/Far North region, and California.

Exhibit 1: Employment, projected occupational demand[1]

Occupation	SOC	2008 Jobs	2018 Jobs	2023 Jobs	2018-23 Jobs % Change	Annual Openings
Computer Programmers	15-1131	4,851	2,854	2,704	-5%	215
Software Developers, Applications	15-1132	2,949	4,245	4,734	12%	374
Software Developers, Systems Software	15-1133	5,954	5,920	6,133	4%	460
Web Developers	15-1134	583	828	868	5%	75
Greater Sacramento Region	**TOTAL**	**14,337**	**13,848**	**14,440**	**4%**	**1,124**
Computer Programmers	15-1131	5,202	3,007	2,856	-5%	229
Software Developers, Applications	15-1132	3,321	4,711	5,261	12%	418
Software Developers, Systems Software	15-1133	6,233	6,166	6,402	4%	482
Web Developers	15-1134	699	1,003	1,058	6%	92
22-County North/Far North Region	**TOTAL**	**15,454**	**14,887**	**15,577**	**5%**	**1,221**
Computer Programmers	15-1131	53,246	34,493	34,947	1%	2,736
Software Developers, Applications	15-1132	71,191	149,165	177,757	19%	14,837
Software Developers, Systems Software	15-1133	74,346	84,666	90,507	7%	6,904
Web Developers	15-1134	11,431	21,716	24,211	12%	2,211
California	**TOTAL**	**210,215**	**290,041**	**327,422**	**13%**	**26,689**

Exhibit 2 shows the percentage change in the number of jobs between 2008 through 2018 and occupational projections from 2018 through 2023. The rate of change is indexed to the total number of jobs in 2008 as the base year and compares 7-county Greater Sacramento region, 22-county North/Far North region, and California.

**Exhibit 2: Rate of change for selected occupations**[2]

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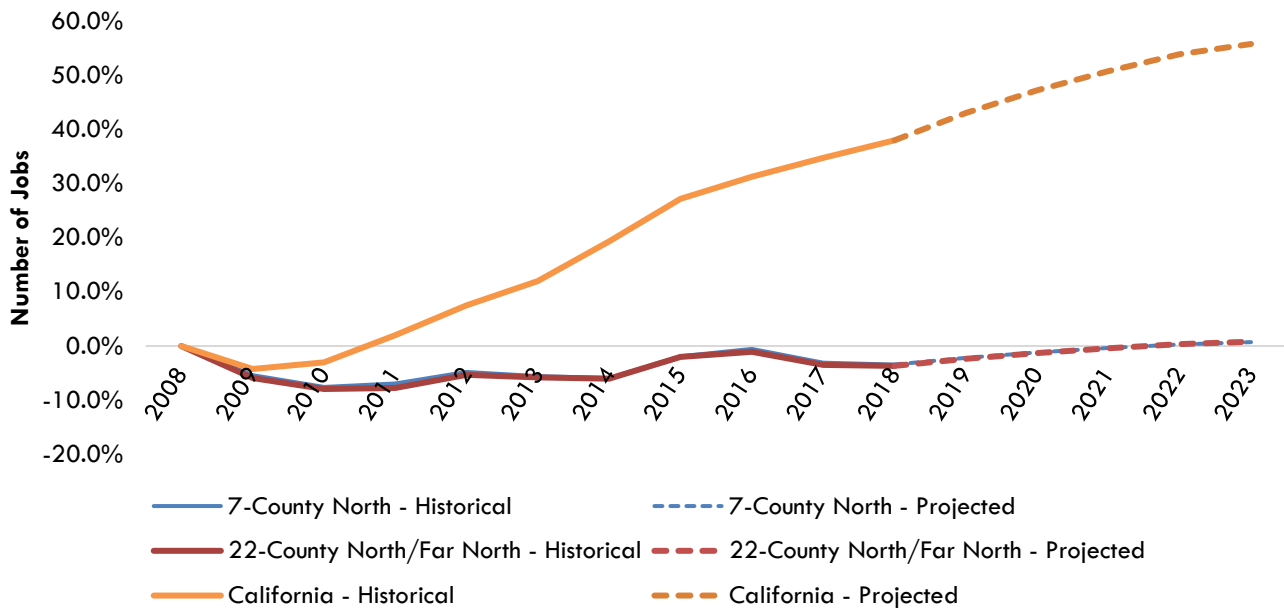
[1] Emsi 2019.1; QCEW Employees, Non-QCEW Employees, and Self-Employed. The 7-county North region includes El Dorado, Placer, Nevada, Sacramento, Sutter, Yolo and Yuba. The 22-county North/Far North region includes the aforementioned counties as well as Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Plumas, Shasta, Sierra, Siskiyou, Tehama and Trinity.
[2] Ibid.

WAGES AND JOB POSTINGS

Exhibit 3 displays hourly wages for selected occupations in the study regions compared to the Sacramento County living wage for a one-adult, one-child household.[3] The chart highlights the difference between the median wages of the representative occupations.

Exhibit 3: Wages for selected occupations[4]
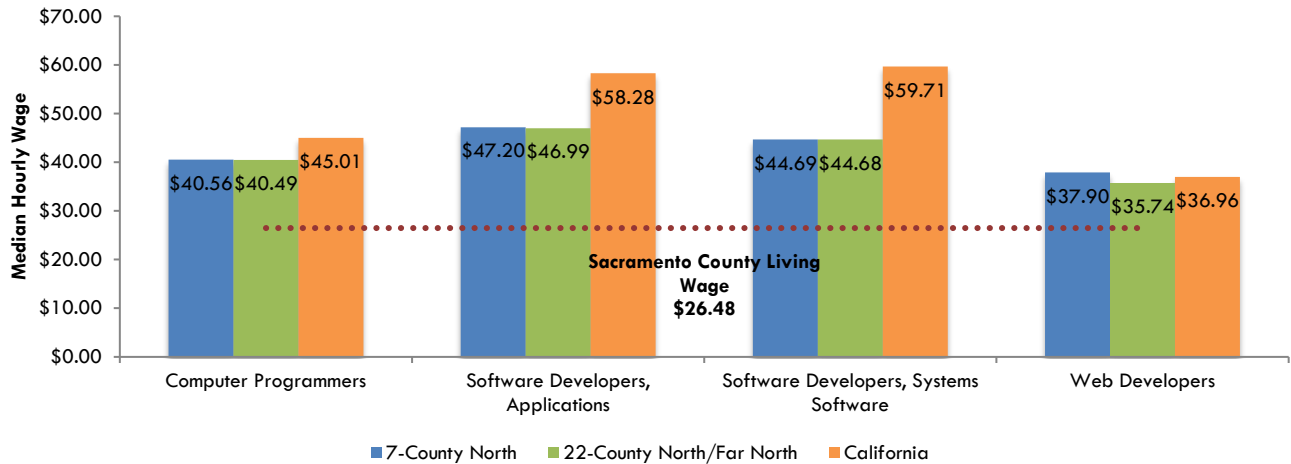
Burning Glass data for job postings identified a pool of 7,373 listings in the North/Far North region on the representative SOC codes. Ninety-seven percent (7,126) of these listings were found in the Greater Sacramento region. Therefore, only the Greater Sacramento pool was analyzed. The data included in this report represent jobs posted over the last year, from April 1, 2018, through March 31, 2019.

Exhibit 4 presents the job postings trend for the SOC codes over the past ten years compared to the median during the same period for the study region.

Exhibit 4: Job posting trend for selected occupations[5]
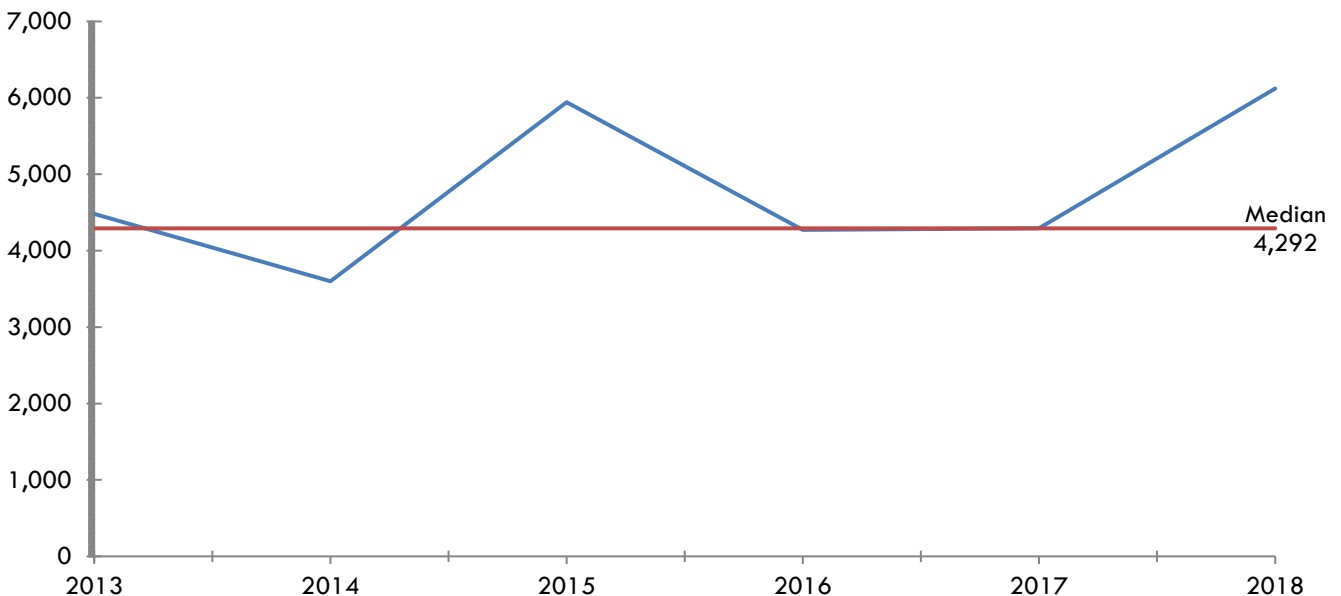
[3] Living Wage Calculator: Counties and Metropolitan Statistical Areas in California, http://livingwage.mit.edu/states/06/locations.
[4] Emsi 2019.1; QCEW Employees, Non-QCEW Employees and Self-Employed.
[5] Burning Glass Technologies, "Labor Insight Real-Time Labor Market Information Tool," http://www.burning-glass.com. 2019.

Exhibit 5 shows the top titles for positions within the selected occupations that were present in the job postings.

Exhibit 5: Top titles for selected occupations[6]

Top Titles	Greater Sacramento	
	Number	Percent (n=7,126)
Software Development Engineer	1,002	14.1%
Java Developer	344	4.8%
.Net Developer	338	4.7%
Applications Developer	249	3.5%
Software Developer	238	3.3%
C E A	199	2.8%
DevOps Engineer	152	2.1%
Web Developer	146	2.0%
Java Engineer	139	2.0%

Exhibit 6 shows the top employers for selected occupation jobs postings in the study regions. There were only 4,096 (out of 7,126) postings with employer information. Therefore, the results below may not be indicative of the entire sample.

Exhibit 6: Top Employers among selected occupations[7]

Top Employers	Greater Sacramento	
	Number	Percent (n=4,096)
State of California	187	4.6%
Intel Corporation	183	4.5%
Revature	100	2.4%
Hewlett-Packard	58	1.4%
Staff Technical Incorporated	49	1.2%
American Express	44	1.1%
Advanced Micro Devices, Inc.	43	1.0%
Accenture	38	0.9%
University California	36	0.9%

Exhibit 7 shows the top skills desired within selected occupation positions in the study regions. There were 6,694 (out of 7,126) postings with skill information.

Exhibit 7: Top skills among selected occupations [8]

| Top Skills	North/Far North	
	Number	Percent (n=6,694)
SQL	2,480	37.0%
JavaScript	2,303	34.4%
Java	1,939	29.0%
Software Development	1,851	27.7%
Software Engineering	1,694	25.3%
Microsoft C#	1,299	19.4%
.NET	1,116	16.7%
Oracle	838	12.5%
Object-Oriented Analysis and Design (OOAD)	831	12.4%

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[6] Ibid.
[7] Ibid.
[8] Ibid.

Exhibit 8 shows the originating location of job postings for the selected occupations postings.

Exhibit 8: Top locations listed for selected occupations[9]
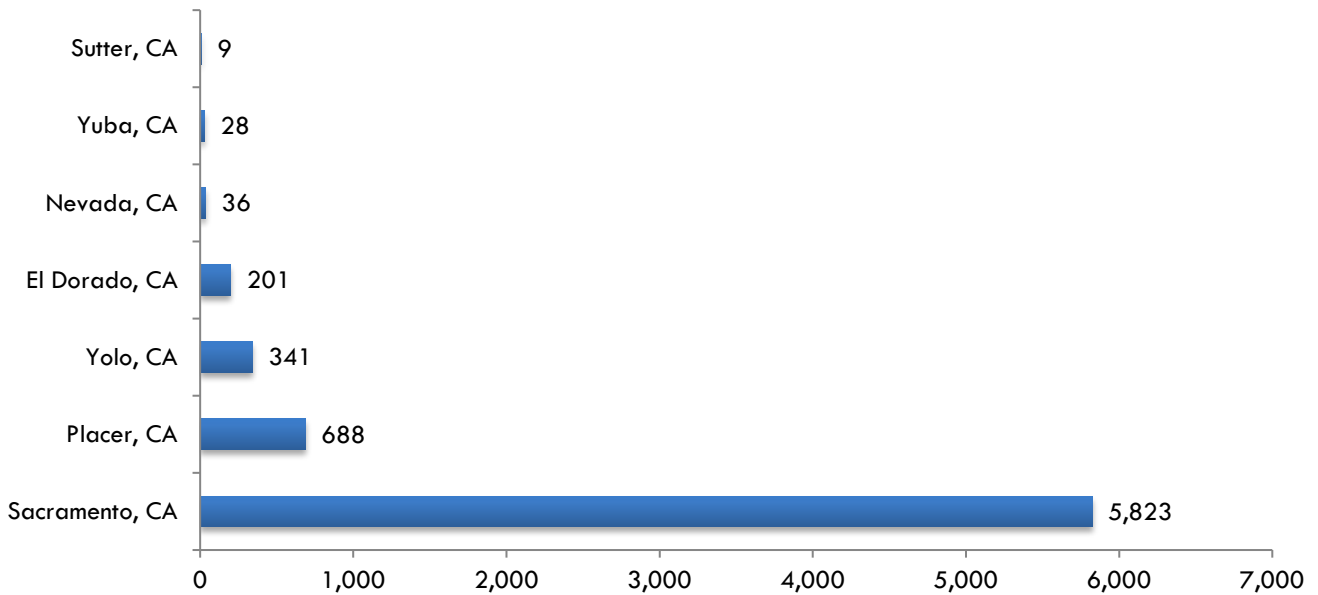
EDUCATIONAL ATTAINMENT AND SUPPLY

At the national level, the typical education for the existing workforce based on suvery data for the selected occupations is a Bachelor's degree. Computer Programmers and Web Developers were more likely to report having an Associate's or some college than Software Developers for Applications and Systems Software. Exhibit 9 breaks down the educational attainment percentages by occupation type.

Exhibit 9: Typical educational attainment for selected occupations, nationally[10]
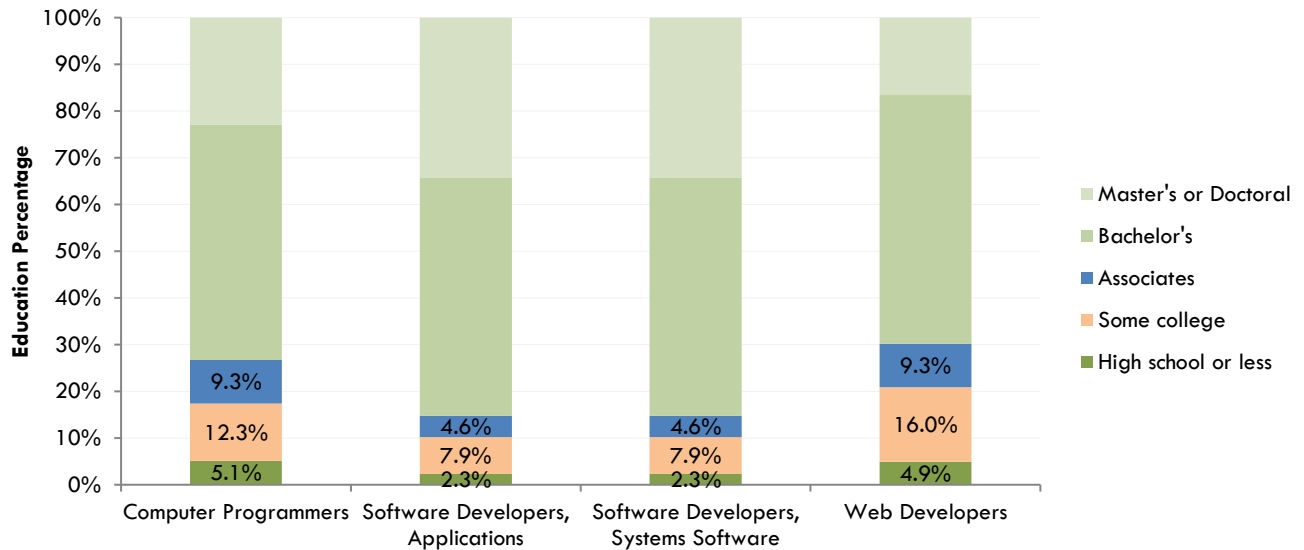
[9] Ibid.

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

There are two Taxonomy of Programs (TOP) codes related to Software Development: Computer Software Development (0707.00) and Computer Programming (0707.10).

Four schools in the Greater Sacramento region offer Computer Software Development or Computer Programming. American River and Cosumnes River Colleges are the most active of the four schools. The chart below displays total awards conferred during the 2015-2018 academic years.

Exhibit 10 shows the total number of awards by colleges during the past three academic years.

Exhibit 10: Total awards conferred by Greater Sacramento community colleges, 2014-2017[11]
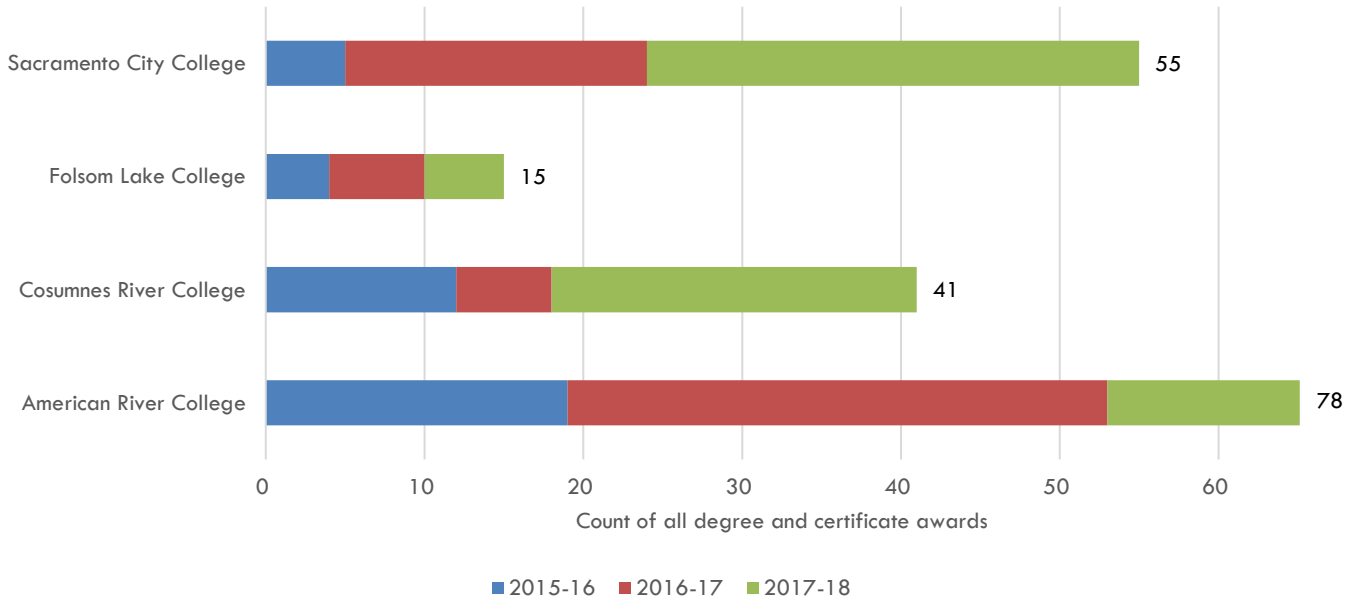

Exhibit 11 shows the break down between certificates and associate degrees for the past four academic years.

Exhibit 10: Certificates and associate degrees conferred by North/Far North community colleges, 2014-2017[12]

	Certificate				Associate			
	2015-16	2016-17	2017-18	3-Year Average	2015-16	2016-17	2017-18	3-Year Average
American River College	6	8	5	6	13	26	20	20
Cosumnes River College	12	6	23	14	0	0	0	0
Folsom Lake College	4	6	5	5	0	0	0	0
Sacramento City College	5	6	12	8	0	13	19	11
Totals	**27**	**26**	**45**	**33**	**13**	**39**	**39**	**31**

FINDINGS

- From 2008 to 2018, occupational demand for Computer Programmers, Software Developers (Applications and Systems Software), and Web Developers declined by 3.4 percent in the Greater Sacramento region, while demand for the same occupations throughout the state rose by almost 38 percent. From 2018-2023, demand for these occupations is projected to increase by 4 percent in Greater Sacramento, while rising by 13% across the state.

- During the last decade, the Greater Sacramento region saw a decrease in demand for Computer Programmers and a large increase in demand (almost 44 percent!) for Software Developers, Applications. These changes closely mirrored what was happening at the state level.

- Over the next five years, demand for Software Developers, Applications is projected to increase in Greater Sacramento and at the state level by 12% and 19%, respectively.

- Median hourly wages for software development jobs are generally above the Sacramento county living wage for one adult and one child at $26.48 per hour. Typical wages for the selected occupations are higher at the state level by an average of almost 27 percent. An exception to this finding is the wage of Web Developers; state wages are typically 5% lower than the Greater Sacramento region.

RECOMMENDATIONS

Information Technology (IT) jobs were historically considered middle-skills jobs – those that required employees to have more than a high school diploma, but less than a four-year degree – and were a great fit for community college instruction. However, the vast majority of employers seeking information technology workers are searching for individuals with a four-year degree. This phenomenon is known as degree inflation, and according to research[13], is driven by two factors: the increasingly complex nature of middle-skill jobs and employer's misperceptions of worker quality and talent at the sub-baccalaureate level. Additionally, employers report having a difficult time finding qualified candidates for IT related jobs as they often lack not only hard and technical skills (such as Microsoft Excel), but also soft-skills (such as poorly written and verbal communication skills). Here are some recommendations:

- Continue to work with regional Information and Communications Technology advisory group to design programs that develop both hard and soft skills required for increasingly complex middle-skill IT jobs, as well as send a strong signal to industry partners that community colleges can and will develop workers who are skilled and capable.

- Incorporate existing programs such as the 21st Century Skills Digital Badging project, an initiative between New World of Work and the Foundation for California Community Colleges, into existing Computer Software Development and Computer Programming to start students on the pathway to improving soft skills.

- Lastly, annual job openings for the associated occupations in Greater Sacramento is projected to be 1,124, while the number of annual average awards specific to Software Development is 62 (certificates and Associate's degrees, combined), indicating a gap in supply.

- The COE recommends that American River College continue its Software Development program, given the supply gap as well as continued projected demand for related occupations in the region and across the state.

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[13] Fuller, J., Raman, M., et al. (October 2017). Dismissed By Degrees. Published by Accenture, Grads of Life, Harvard Business School.

COE Recommendation		
Move forward with program	Program is not recommended	Additional information needed
☑	☐	☐

APPENDIX A: DATA SOURCES

Sources used for data analysis purposes in this report include:

- U.S. Department of Labor/Employment and Training Administration (DOLETA) O*NET Online

- Burning Glass, Labor Insight/Jobs

- Economic Modeling Specialists, International (EMSI)

- California Employment Development Department, Labor Market Information Division (EDD, LMID)

- Bureau of Labor Statistics, Occupational Employment Statistics (OES)

- California Community Colleges Chancellor's Office, Cal-PASS Plus LaunchBoard

- Living Insight Center for Community Economic Development, Self-Sufficiency Standard Tool for California

- California Community Colleges Chancellor's Office Management Information Systems (MIS Data Mart)

- U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

For more information, please contact:

Ebony J. Benzing, Manager
Center of Excellence, North-Far North Region
Ebony.Benzing@losrios.edu

April 2019