The Future of Work: The Effect of Job Automation on African-American and Latino Workers in Three Cities

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INTRODUCTION

Workers across the country are vulnerable to the effects of job automation and worker displacement. The resulting unemployment and underemployment of large swaths of the American workforce will have significant negative impacts on individuals, families, and the communities in which they reside. In anticipation of progressive job loss due to automation, local leaders and policy makers must understand the future of work, marshal resources to prepare young adults for employment, and (re)train the existing workforce to be active, productive participants in the changing labor market.

This report provides an overview of the current state of research on job automation and provides a case study of job automation in three cities: Gary, Indiana; Columbia, South Carolina; and Long Beach, California. The study focuses on the impact of projected job automation on African-American and Latino workers and assesses the education and training capacity of existing schools and programs. Finally, this report provides recommendations for the development and expansion of education and training programs to meet the requirements of the future of work.

KEY FINDINGS

State of Job Automation

- Automation, or the use of computer-controlled equipment to perform tasks, is changing the nature of work, the composition of employment, and the distribution of income.
- Forecasts predict that 9% to 47% of occupations (13 million to 68 million jobs) will be lost to automation in the upcoming decades.
- Job loss will be unequally distributed, affecting individuals with lower levels of education and African-American and Latino populations with greater severity.
- Social skills, creative intelligence, perception, and manipulation are difficult to automate. Jobs requiring these skills are less susceptible to automation and job loss.

Three City Case Study

- Gary, Indiana; Columbia, South Carolina; and Long Beach, California, are geographically and demographically diverse.
- These cities are engaging in efforts to innovate in public secondary career and technical education, but they continue to face challenges of low academic performance as well as low rates of college and career preparedness.
- African-American and Latino populations are underrepresented in local public technical colleges and universities.
- States have a variety of workforce training initiatives; however, these programs do not yet operate at a scale needed to reach all vulnerable workers.

Lessons for Local Leaders and Policy Makers

- Develop policies and practices and foster a culture promoting ongoing education and (re)training for all workers, with particular attention to communities where individuals have low levels of educational attainment.
- Support robust and equitable primary and secondary academic training as the foundation for building students' skills.
- Provide innovative and data-driven programs connecting all students to career training and college.
- Build pathways to ensure equitable transitions from secondary to post-secondary training and education.
- Develop an information dissemination platform to collect and share training and job opportunities with residents.
- Identify and make use of workforce development funding from federal and state programs.
- Support the development of a data management system to track the success of various job training programs, with attention to diversity, equity, job placement, and job longevity.
- Learn from and build on workforce development efforts that have been successful in other municipalities and states.

Debates and Developments in Projecting Job Automation

Automation is the use of computers and technology to perform tasks in substitution for human labor. Forecasts of the percentage of American jobs at risk of loss due to automation in the next few decades range from 9% to 47%.[1],[2] This variation in projections of job loss can be attributed to researchers' use of differing assumptions to model future labor needs. These assumptions include the following:

Predictions of the effects of technology substitution versus complementarity: Substitution assumes that technology will cause the displacement of human labor, leading to joblessness.[3],[4] Complementarity predicts that labor-saving technology will be balanced by economic growth and greater employment in other sectors and by the increased value of the tasks that humans uniquely supply.[5]

Skill vs. task analysis: Early analyses of the effects of automation on labor needs use the Occupational Information Network (O*NET) job classification system developed by the U.S. Department of Labor, which provides descriptions of tasks specific to occupations. Some researchers argue that this method of analysis, while informative, does not account for the considerable variation in the tasks involved in jobs having the same occupational title. More recent studies focus on cognitive and workplace skills or capacities,[6] under the argument that these metrics provide a more fine-tuned assessment of occupations.[7]

*Level of occupational classification:*The U.S. Bureau of Labor Statistics classifies jobs into 23 major occupational groups. [8] The 23 major occupational groups encompass 98 minor occupational groups, which are further divided into 459 broad occupations consisting of 867 detailed occupations. Projections vary depending on the level of occupational aggregation.

Technological factors: Projections of future labor needs are further attenuated by the general inability to predict with precision factors such as the speed of automation diffusion and the development of machine learning, data mining, mobile robotics, machine vision, and other subfields of artificial intelligence that are dedicated to the automation of non-routine cognitive tasks. [9]

Despite variation in the projected percentage of jobs that will be lost to automation, even the moderate projection of 9% job loss translates to 13 million jobs becoming obsolete.[10] The more severe projection that 47% of jobs will be lost translates to the elimination of 68 million jobs. Such significant job loss mandates the need to provide strategic job training and support to those who will be most affected by automation.

Unequal Distribution of Job Loss Due to Automation

Studies consistently show that the distribution of job loss due to automation is and will continue to be unequal. Jobs with the highest risk of automation are those that require the least amount of education; therefore, individuals with lower levels of education will be most adversely affected by automation.[11] Further, job loss due to automation will have unequal effects across racial and ethnic groups because educational attainment as well as the occupational distribution of workers varies by race and ethnicity.

Although levels of education vary across cities and geographical areas, African-American and Latino populations attain lower levels of education when compared with white populations nationally. As depicted in Figure 1, among individuals over 20 years of age, 67% of those who identify as white (alone) have more than a high school degree, whereas only 57% of those who identify as African-American (alone) and 40% of Latinos have more than a high school degree. Policies and investments to improve the education and training of students as well as adult learners, particularly in communities with trends of low educational attainment, are necessary to mitigate the negative and unequal effects of job automation.

Figure 1. Educational Attainment of Civilian Labor Force over 20 Years of Age, by Race/Ethnicity
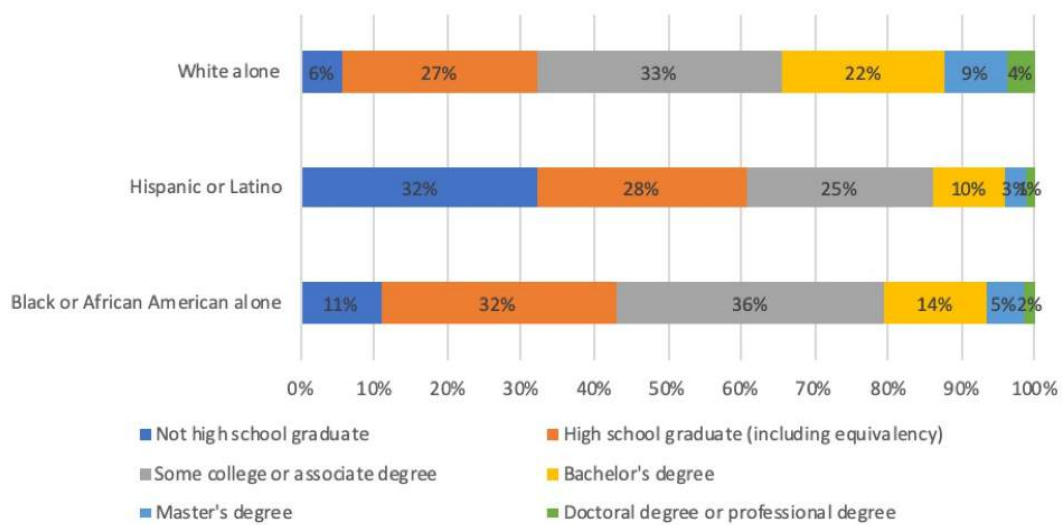
Source: American Community Survey, EEO 7r. Educational Attainment (6) by Younger Age Groups, Sex, and Race/Ethnicity (Part I) for Residence Geography, Total Population, Number (2006-2010).

Skills Needed by the Future Workforce

Evolving technological advances in the areas of machine learning and artificial intelligence mean that over the course of an individual's work life, the skills necessary for employment will likely change. Therefore, ongoing adult learning and workforce retraining will be a necessary feature of education and labor policies.

Identifying the skill requirements of the future labor market is an ongoing challenge because it requires continuous forecasting of the nature of future jobs. Researchers have suggested identifying the bottlenecks to automation (i.e., tasks that are difficult to automate) as a method of planning for future labor needs. Studies have identified bottlenecks such as social intelligence, or the ability to effectively negotiate complex social relationships, including caring for others and recognizing cultural sensitivities; creative intelligence; and perception and manipulation (see Table 1). Empirical evidence shows that occupations requiring these skills indeed have a lower risk of automation.[12]

Table 1. Bottlenecks to automation and corresponding skills

Bottlenecks to Automation	Skills
Social Skills	Advise, counsel, inform others
	Care for others
	Decision-making
	Persuade and influence others
	Responsibility for others
	Teach
Creative Intelligence	Analyze complex problems
	Improve processes/ new ideas
	Research and development
Perception and Manipulation	Dexterity
	Working in awkward positions

Source: BIBB/IAB and BIBB/BAuA Employment Surveys 2006 and 2012, UK Skills Surveys 1997, 2001, 2006, 2012.

The following case study assesses the impact of projected job automation on African-American and Latino workers and provides assessments of the education and training capacity of existing schools and programs in three cities: Gary, Indiana; Columbia, South Carolina; and Long Beach, California. This assessment of the labor market and education and training opportunities in geographically and demographically diverse cities offers guidance to leaders and policy makers in other cities seeking to better understand the potential impact of job automation on their local populations as well as guides by which to assess their educational and workforce training capacities.[13],[14]

Demographic Profile of Three Cities

Table 2 provides demographic profiles of the three cities. Gary, Indiana, has a population of 77,416. The majority of the population is African-American: 80% identify as African-American (alone), 12% identify as white (alone), and 6% identify as Latino of any race.[15] In Gary, 55% of the population is of standard working age, 20 to 64 years old. Median earnings for full-time, year-round workers are $32,569, ranging from $14,922 for individuals with less than a high school degree to $44,539 for those with a graduate degree.[16] The overall unemployment rate is 13%; however, rates of unemployment are higher for those with lower levels of education and higher for African-Americans (17%), compared with Latinos (12%) and whites (12%).[17]

Columbia, South Carolina, has a population of 132,236. The majority of the population is white: 48% identify as white (alone), 41% identify as African-American (alone), and 6% identify as Latino of any race.[18] In Columbia, 62% of the population is between the ages of 20 and 64 years. Median earnings for full-time, year-round workers are $40,398, ranging from $15,980 for those with less than a high school degree to $53,005 for those with a graduate degree.[19] The overall unemployment rate is 6%; however, rates of unemployment are higher for those with lower levels of education and higher for African-Americans (15%), compared with Latinos (6%) and whites (4%).[20]

Long Beach, California, has a population of 470,489. The majority of the population is Latino: 43% identify as Latino, 28% identify as white (alone), and 12% identify as African-American (alone). In Long Beach, 63% of the population is between 20 and 64 years old.

Median earnings for full-time, year-round workers are $46,054, ranging from $21,453 for those with less than a high school degree to $77,638 for those with a graduate degree.[21] The overall unemployment rate is 7%; however, rates of unemployment are higher for those with lower levels of education and higher for African-Americans (14%), compared with Latinos (8%) and whites (7%).[22]

Table 2. Demographic Profiles of the Three Cities

	Gary	Columbia	Long Beach
Total Population	77,416	132,236	470,489
Between ages 20-64 Years	55%	62%	0.63
African-American (alone)	80%	41%	12%
White (alone)	12%	48%	28%
Latino (any race)	6%	6%	43%
Below Federal Poverty Level	36%	22%	19%
Median Earnings for Full-Time Worker	$32,569	$40,398	$46,054
Less than HS	$14,922	$15,980	$21,453
HS Diploma or Equivalent	$24,461	$21,576	$29,007
Some College	$25,812	$28,399	$36,582
Bachelor's Degree	$34,786	$42,722	$57,088
Graduate or Professional Degree	$44,539	$53,005	$77,638
Unemployment (25-64 Years)	13%	6%	7%
Less than high school graduate	25%	17%	8%
High school graduate (includes equivalency)	15%	12%	9%
Some college or associate's degree	11%	9%	7%
Bachelor's degree or higher	7%	2%	4%

Source: American Community Survey, 2017

Assessing the Effect of Job Automation on African-American and Latino Workers: A Look at Two Models

Researchers have calculated the effect of automation on occupations using varying assumptions and levels of analyses. Because projection models include varying assumptions, the projections often have different names. Figures 2 and 3 present two projections: (1) the probability of automation[23] and (2) the probability of future demand,[24] focusing on the occupational distribution of African-American and Latino workers across the three cities. While the findings are slightly different, with the latter projection estimating more moderate effects of automation, the key takeaway lesson from each projection is the same: a significant proportion of African-American and Latino workers across the three cities are in occupations that have a high risk of loss due to automation.[25]

Model 1: Probability of Automation
Figure 2 presents the probability of automation of 459 broad occupational groups using a task-based assessment of occupations.[26],[27]

Figure 2. Risk of Job Automation
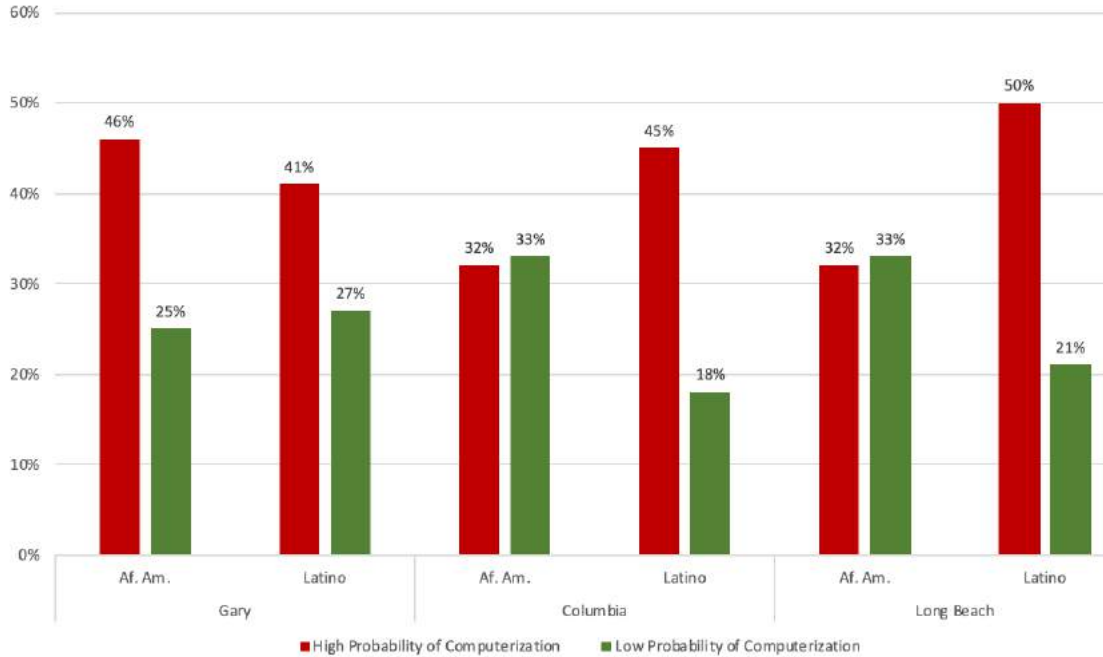
Source: African American Mayors Association, Mason, P. (2019). Automation and occupational change: assessing the impact of technological change on African American and Latino workers. Working Paper.
Note: High probability of automation is defined as >70% risk of automation. Low probability of automation is defined as <30% risk of automation.
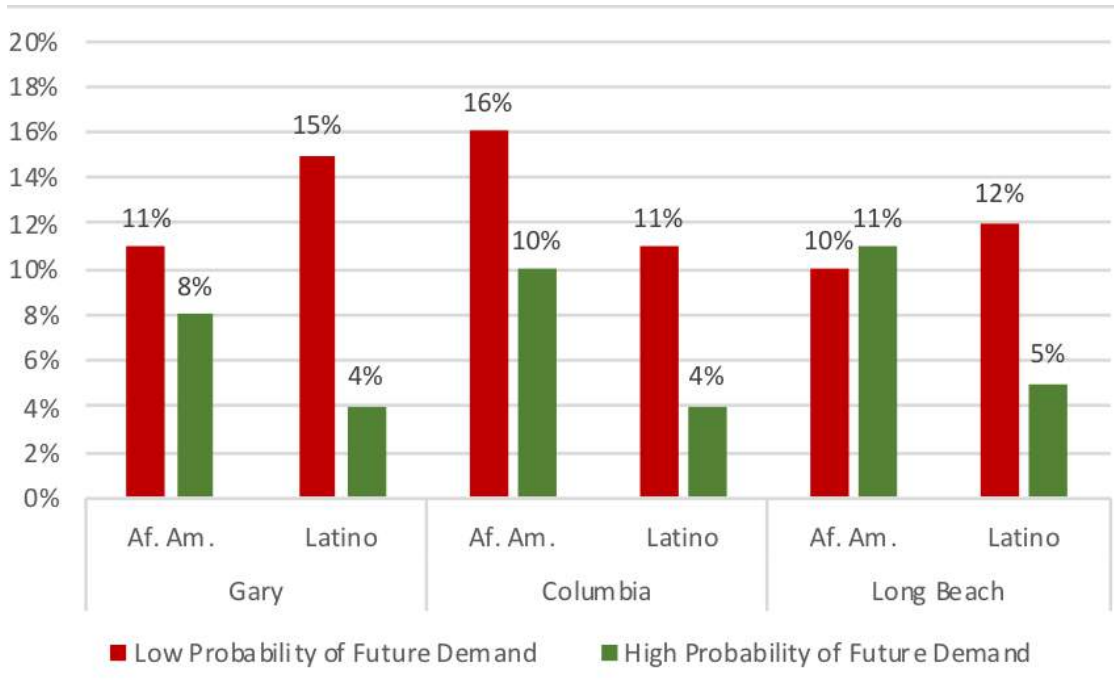
Model 2: Probability of Future Demand
Figure 3 presents a different set of calculations showing the probability of future demand for occupations. Low probability of future demand means that an occupation will likely shrink, while a high probability of future demand means that an occupation will likely grow. This model uses calculations for the 98 minor occupational groups using a 120-point assessment of the skills, knowledge, and abilities needed for an occupation. In addition to automation, trends included in this model include urbanization, increasing inequality, political uncertainty, technological change, demographic change, globalization, and environmental stability.

Compared with the projection in Model 1 of the probability of automation, the projection of the probability of future demand in Model 2 predicts a more moderate effect of automation on occupations; however, the two projections have similar patterns for African-American and Latino workers. With evidence showing that a significant portion of the jobs held by African-American and Latino workers are likely to become obsolete, leaders and policy makers must develop education and labor policies that provide strategic and ongoing education and training to the future workforce.

Figure 3: Probability of Future Demand

Source: African American Mayors Association, Mason, P. (2019). Automation and occupational change: assessing the impact of technological change on African American and Latino workers. Working Paper.
Note: Low probability of future demand is defined as <30% probability of demand; shrinkage of this occupation is likely. High probability of future demand is defined as >70% probability of demand; growth of this occupation is likely.

Education and Training Landscape

Across the three cities, levels of educational attainment vary between racial and ethnic groups, with white populations obtaining higher levels of education when compared with African-American and Latino populations. Lower rates of educational attainment by African-American and Latino workers is a concern because occupations available to individuals with lower levels of education are at greater risk of automation.

Innovative Initiatives in Public Secondary Education

Each city's publicly provided secondary education system offers standard as well as innovative courses to high school students.

Gary

The education system in Gary serves approximately 3,526 high school students in three public high schools and four charter high schools. Gary Middle College (GMC) serves non-traditional students, offering a dual enrollment program that allows students to participate in high school classes and attend Ivy Tech Community College classes for up to 60 hours of college credit. To support the use of online learning, GMC is phasing in the use of individual computers and a Google for Education platform to allow remote sharing of course materials and assignments.[28]

Columbia

Columbia's 16 public high schools serve approximately 15,992 students. The schools offer a Career and Technical Education (CATE) program, intended to integrate career and technical instruction into courses for middle and high school students. Beginning with an Introduction to Career Clusters course offered in middle school, the CATE program introduces and trains students for careers in the 16 national career clusters adopted by the South Carolina Department of Education.[29] Among the city's 16 high schools, 3 are virtual, and some of the brick-and-mortar high schools allow students to enroll in online courses to supplement course offerings.

Long Beach

The 12 high schools in Long Beach serve approximately 25,368 students.[30] High schools in Long Beach are organized into small learning communities in which students are divided into cohorts around industry themes identified by the California Department of Education as high need and highly employable.[31] Implemented in 2009 with funding from the James Irvine Foundation, the linked learning approach offers rigorous academics, career-based learning, work-based learning, and personalized support.

Challenges with Outcomes and Program Availability and Use

Despite efforts across the cities to connect high school students with post-secondary education and career opportunities, the cities are still plagued with low performance on standard academic measures and indicators of college or career readiness.[32] For example, in Gary, rates of college and career readiness range from 30% to 75% across schools;[33] in Columbia, only 32% of high school graduates were college-ready, and only 54% were career-ready;[34] and in Long Beach, 64% of white students met the measure of college and career preparedness in 2017 whereas only 36% of Latino students and 30% of African-American students met the measure of preparedness.[35] Other challenges include unequal availability and utilization of career and technical education programs across the cities' high schools and evidence of disparate academic performance along racial and ethnic lines.

Post-secondary Education and Training

The three cities have post-secondary institutions that offer courses and credentials promoting social skills, creative intelligence, and perception and dexterity (i.e., the bottlenecks to automation). Additional institutions are located within 20 miles of each city. However, there is evidence of low and unbalanced enrollment for African-Americans in Gary and Columbia and for African-Americans and Latinos in Long Beach. For example, in Gary, African-Americans make up over 80% of the public high school population but only 21% of the student body at the local public technical college[36] and 18% of the population at the local public university.[37] Similarly, in Columbia, African-Americans make up 50% of the public high school population but only 35% of the student population at the local technical college and 9% of the population at the local public university.[38] In Long Beach public schools, where 54% of students identify as Latino and 14% as African-American, Latinos make up 59% of the student body at the local public technical school, but African-Americans are only 11% of the student body there, and at the local public university Latinos and African-Americans are only 42% and 4% of the student population, respectively.

Workforce Training

Indiana, South Carolina, and California have developed a variety of workforce development initiatives that can serve as models for other states and localities.

In these states, governmental administrative offices and bodies manage the use of public funds to support workforce training (e.g., Department of Employment and Workforce in South Carolina). Administrative offices have developed online databases and app-based platforms to share apprenticeship, training, and job opportunities available in each county. In addition, government-convened partnerships bring together educational institutions, economic development groups, workforce systems, and community organizations to align training and industry-specific workforce needs within regional markets (e.g., Indiana's Workforce Councils).[39]

States have marshaled state and federal funds to support the development of apprenticeship programs. For example, the U.S. Department of Labor awarded California's Department of Industrial Relations a $1.8 million ApprenticeshipUSA State Expansion Grant to develop and expand apprenticeship programs in the state.[40] The grant will allow the Division of Apprenticeship Standards in the state's Department of Industrial Relations to double the number of apprentices (from approximately 74,000) between 2017 and 2027, increase equity and diversity, and extend apprenticeship programs to emerging and high-growth industries.[41],[42] In addition, California requires that all public works contracts valued at $30,000 or more include an obligation to hire apprentices.[43] To further support apprenticeships, state administrative offices enforce apprenticeship standards regarding wages, hours, working conditions, and state certification.

States have procured funding for workforce (re)training programs. In Indiana, Next Level Jobs is an initiative by the governor and legislature to develop the state's workforce with a focus on high-priority industries and in-demand, high-paying jobs. Next Level Jobs provides Workforce Ready Grants to help individuals pay for training and Employer Training Grants for employers to train individuals in high-priority areas. In California, the Employment Training Panel assists employers that offer their workers training that leads to well-paying, long-term jobs.[44] In 2018, the Employment Training Panel provided approximately $5.5 million to companies to support employee training in the Los Angeles County area.[45]

States have made commendable inroads in providing various workforce development initiatives. However, there is still a need for systems of comprehensive workforce development that reflect and accommodate the need for continuous training of the workforce amid progressive job automation.

LESSONS AND OPPORTUNITIES FOR LOCAL
LEADERS AND POLICY MAKERS

Local leaders have a close-up view of the needs and experiences of residents and local industries. They also have close connections to school boards and county and state government officials. Thus, local leaders are in strategic positions to marshal and coordinate resources and disseminate information about education and workforce training programs. In addition, local leaders can lobby state and federal governments to support high-quality, evidence-based programs and develop comprehensive systems of workforce development. With information about the needs and resources within their communities, local leaders can be at the forefront of efforts to prepare their workforce for the future.

Insights and Recommendations

Robust primary and secondary education and ongoing adult learning and workforce (re)training are necessary features of education and labor policies. Local leaders and policy makers should seek to develop policies and practices and foster a culture promotive of ongoing education and (re)training for all workers, with particular attention to communities where individuals have low levels of educational attainment.

Group-Specific Engagement Strategies

In addressing workforce development, leaders must focus on two distinct groups to prepare for the impact of automation: students and the workforce. Below is a list of recommendations for strategies to support each group's active and productive engagement in the changing labor market.

Students

- Support robust and equitable primary and secondary academic training as the foundation for building students' skills.
- Provide innovative and data-driven programs connecting all students to career training and college, with a focus on program enrollment and completion.
- Build pathways to ensure equitable transitions from secondary to post-secondary training and education.

Workforce

- Develop an information dissemination platform to collect and share training and job opportunities with residents.
- Identify and make use of workforce development funding from federal and state programs.
- Support the development of a data management system to track the success of various job training programs, with attention to diversity, equity, job placement, and job longevity.
- Learn from and build on workforce development efforts that have been successful in other municipalities and states.

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(L-R) Chanelle Hardy, Mayor Steve Benjamin, Zoelene Hill, Ph.D, Stephanie Mash Sykes, Esq.
AAMA Future of Work Panel at the 2019 African American Mayors Association Annual Conference in Houston, Texas.