COVID-19 and the Future of Work

Seattle Jobs Initiative

Seattle Office of Economic Development

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INTRODUCTION

The Network Economy will be driven by creative, imaginative, and technically inventive work that increasingly leverages information technology in its inspiration, production, and distribution.

We are in the midst of a **Fourth Industrial Revolution**, changing the nature of work as technology is introduced that takes over tasks, freeing humans to do other things.[1] Automation is driving this revolution, and the growing networks of Internet-connected people and devices, distributed production of renewable energy, and electrification of transportation are making it possible.[2,3] The economic system emerging from the Fourth Industrial Revolution, the Network Economy, will be driven by creative, imaginative, and technically inventive work that increasingly leverages information technology in its inspiration, production, and distribution.

The COVID-19 pandemic is likely to accelerate the emergence of the Network Economy as it has required new ways of work centered on technology. Before this crisis, substantial and growing economic disparities existed across our workforce, characterized by inequitable access to and representation of racial and ethnic groups in living-wage jobs with benefits, leave, and regular and reliable[4] schedules, let alone in high-wage occupations with power and influence. Much as COVID-19 has disproportionately impacted low-wage workers, the evolving labor market needs of the Network Economy threaten to compound existing economic inequalities.

This paper explores the Network Economy and its implications for the workforce and serves as a guide for policymakers who aim to build a more equitable and inclusive economy. More immediately, it can help inform economic recovery workforce policies to ensure residents are prepared for these economic shifts and are connected to jobs in the future. Finally, while this research and analysis are focused on the Seattle area, the reader will find similar economic shifts occurring in other communities with attendant implications for the local workforce.

DEFINING THE NETWORK ECONOMY

A massive transformation of the economy is well underway, now being accelerated by the COVID-19 crisis. This Fourth Industrial Revolution is creating profound, albeit yet-to-be-fully-determined impacts on how we live and work.[1,5-7] The shape of the economy—the Network Economy—that emerges from this revolution depends on how we respond to the changes underway.

Economies undergo major restructuring when three developments converge: new methods of harnessing energy, new modes of transportation, and new means of communication. The First Industrial Revolution took place thanks to the introduction of steam power, trains, and the telegraph and cheap print. The Fourth Industrial Revolution, in contrast, is being driven by the availability of distributed renewable energy, the electrification and possible automation of transportation, and the Internet of Things (IoT), a system in which a vast array of internet-connected devices generates and communicates an immense amount of data largely unmediated by humans.[2,3]

Building on the Third Industrial Revolution's development and utilization of information technology and digitalization, the Fourth Industrial Revolution is characterized by the exponential growth of innovation driven by new combinations of technologies in the physical, digital, and biological spheres. This innovation will transform "entire systems of production, management, and governance" and will likely disrupt industry on a broad scale.[1]

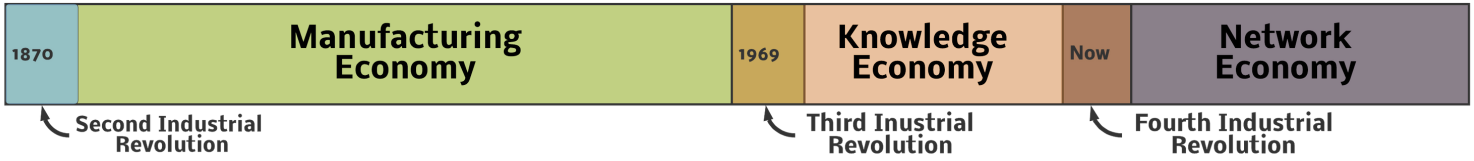

Figure 1. Economic Eras

The Network Economy

Emerging from the Fourth Industrial Revolution, the Network Economy is a new economic model in which people work together across time and distance by forming potentially vast decentralized networks. Through these networks, people can coordinate and share information and develop direct marketplaces for the services and products they create.[2] Information and ideas are increasingly widely, instantly, and inexpensively shared, reducing reliance on traditional corporate structures.

The Network Economy and the Knowledge Economy that preceded it are both driven by the creation of knowledge and ideas. The Knowledge Economy began as a primarily technical endeavor, highly STEM-focused, with much of its economic value generated through the design and production of technology and the use of this technology. In contrast, the Network Economy will be driven by both creative, imaginative, and technical inventive work that increasingly leverages information technology in its inspiration, production, and distribution.

Figure 2 (right), portrays the anticipated job composition of the Network Economy in comparison to preceding economic eras, with a diminished proportion of local service sector jobs, a larger share of knowledge and creative jobs, and the emergence of a new set of occupations that are yet to be defined.

Whether the coming Network Economy is a **democratized, resilient, and adaptive economy**[8-12] will depend on having adequate infrastructure, a workforce that is prepared to take part, and networks being accessible. This means that the telecom and electrical grids are robust enough to handle demand and that everyone has the necessary digital literacy skills, digital tools (e.g., computer and Internet access), and **opportunities to participate in the economy.**

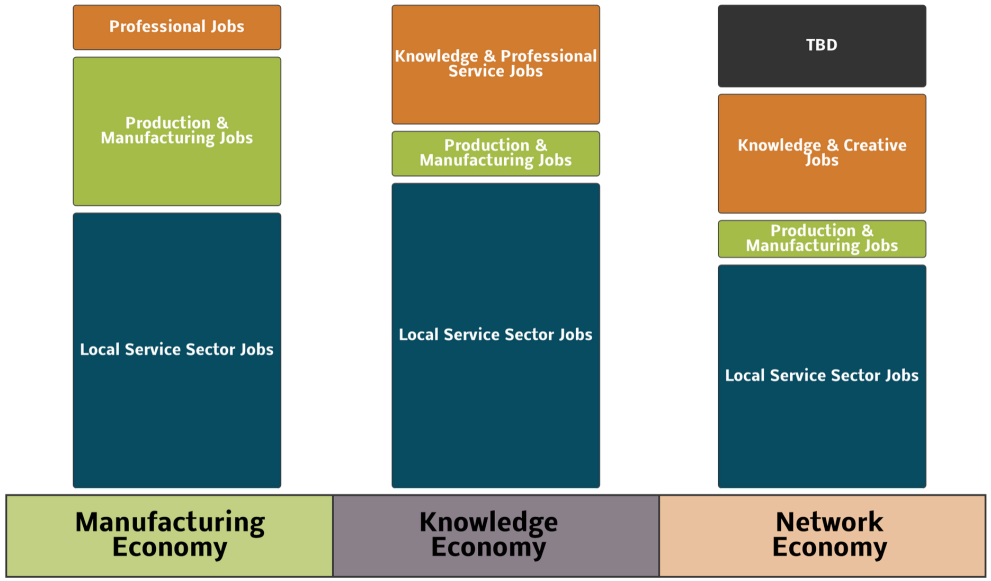

Figure 2. Economic Sectors by Era

How COVID-19 Might Accelerate the Network Economy's Emergence

The COVID-19 pandemic has radically altered the workforce landscape in a few short weeks, eliminating more than 20 million jobs nationally and 200,000 jobs in the first seven weeks of the COVID-19 response in King County alone,[13] and heading the US into recession. This recession is likely to follow the pattern of the three previous "jobless recoveries." The jobs eliminated during these recessions were overwhelmingly routine (e.g., bookkeeping, routine production). These are precisely the jobs most susceptible to automation. Unlike recessions before the 1990s, the jobs eliminated in more recent recessions did not return during the subsequent recoveries or ever. The share of routine jobs fell from 56% of total employment in 1982 to 42% in 2017. Eighty-eight percent of those were lost within 12 months of the trough of these recessions.[14-16]

200,000

Jobs eliminated in the first seven weeks of the COVID-19 response in King County alone

Recessions spur companies to eliminate less productive workers and restructure operations to lower costs.[14] While some labor cost reduction has been accomplished by offshoring, automation technology, particularly robotics and software, is associated with a larger decrease in employment.[17]

Complicating recovery, pre-pandemic work conditions cannot resume without a vaccine, which is many months if not years away.[18*] The need to maintain physical distance between workers will make labor-saving automation more attractive. Many tasks that can be automated to eliminate or reduce face-to-face interaction or increase space between individuals will be so that economic activity can resume with minimal risk of transmitting COVID-19. **The longer businesses anticipate needing to engage in physical distancing, the more the value of investments in automation increases.**

The pandemic is also accelerating the digitalization of the workforce. All but the most essential occupations are digitally mediated. Individuals working from home, restaurants converting to app-based takeout and delivery, retail stores serving customers with curbside pickup via online ordering, and musicians holding concerts online are just a few examples. Perhaps the most dramatic example is the sudden migration of all in-person training and education to online in a matter of a few weeks. **While some of these trends may stagnate or reverse, many changes brought on by COVID-19 are likely here to stay.**

*The fastest a vaccine has ever come to market, the mumps vaccine, is five years.

IMPLICATIONS OF THE NETWORK ECONOMY FOR SEATTLE'S WORKFORCE

The Network Economy will see the automation of part or all of many jobs,[19-21] presenting a high risk of displacement to one in five workers in Seattle.[22,23] Impacts will be felt across all industries and occupational clusters but will **disproportionately impact individuals with a high school education or less as well as communities of color.** Workers will need to gain new skills to be competitive in the Network Economy; unfortunately, **current systems are not adequately prepared to assist workers in making this transition.**

Three Drivers of Job Disruption through Automation

Automation is simply defined as technology that replaces some form of human labor. Automation changes and eliminates jobs through its three mechanisms: **robotics, software, and artificial intelligence.**[17]

- **Robotics**: machines that replicate human movements to replace physical labor.
- **Software**: computer programs that store, retrieve, and process data according to pre-determined rules.
- **Artificial Intelligence:** computer systems that mimic human cognition to do tasks that otherwise require human intelligence.

In the Seattle MSA, one in five jobs has a high risk (both high probability and high exposure to automation technology) of being automated. Some occupations have high exposure to all three mechanisms of automation, while others are only exposed to one or two.

Occupational Impact

The shift to automation has happened in fits-and-starts over the last three decades, but substantial restructuring tends to occur within 12 months of a recession.[16] Within this context, we look at the Seattle area occupations that are at high risk of automation and those experiencing substantial layoffs due to COVID-19, and the extent to which these overlap (see Figure 3).

Figure 3. Relationship Between Automation and COVID-19 Layoffs in Seattle MSA

The occupations in the Seattle MSA that account for the largest number of UI claims in the first wave of COVID-19 layoffs are split between high and moderate risk for automation. They have also been the source of one-fifth of the unemployment insurance (UI) claims in the first two months of the COVID response (see Table 1). While these occupations may not be fully automated in the short run, **the pressures to reduce labor costs and increase physical distance will make investments in automating some of these jobs more cost-effective than they were pre-COVID.**

Occupations with the Most Initial UI Cliams by Automation Risk
March 8-May 9, 2020

Risk	Occupations	King County UI Claims	Seattle MSA UI Claims
High	Retail Salespersons	8,716	16,751
	Carpenters	4,309	10,031
	Taxi Drivers & Chauffeurs	7,337	9,158
	Bartenders	5,383	8,779
	Cashiers	4,029	7,397
	Construction Laborers	2,603	6,712
	Dental Assistants	2,674	5,965
	Receptionists	2,871	5,643
Moderate	Waiters and Waitresses	10,708	18,025
	Sales Managers	9,172	15,806
	General & Operations Mngrs	8,703	14,656
	Hairstylists	5,542	10,859
	Electricians	3,188	8,339
	Customer Service Reps	4,088	7,577
	Construction Managers	3,140	6,548
	Stock Clerks & Order Fillers	3,165	6,348
	Cooks, Restaurant	3,720	6,189
	Childcare Workers	3,098	5,821
Not Estimated	Production Workers, All Other	4,031	9,176
	Managers, All Other	4,333	7,661

Risk
High
Moderate
Not Estimated

Table 1. Largest Occupations in the Seattle MSA [17,19,24]

[+] There are several limitations of unemployment claim data. First, during the first several weeks, many workers including contract, gig, and self-employed workers were not eligible (the CARES Act expanded eligibility in mid-April). Second, the UI claim system was overwhelmed with the rapid increase in the number of claims and many people were unable to file in a timely manner. Third, given that filing and processing were done remotely, those who lack digital access or have a lower level of digital literacy may have had more difficulty navigating the filing processing. Finally, there is evidence of a significant number of fraudulent claims, which means that figures should be interpreted with caution.

Impacts on Communities of Color

The emergence of the Network Economy will have a disproportionate impact on workers of color as they are more highly represented within jobs most at risk of automation. **Latinx, Native American/Alaskan Native, Pacific Islander, and Black/African workers are most exposed to automation,** followed by white and Asian/Asian American workers (Figure 4).

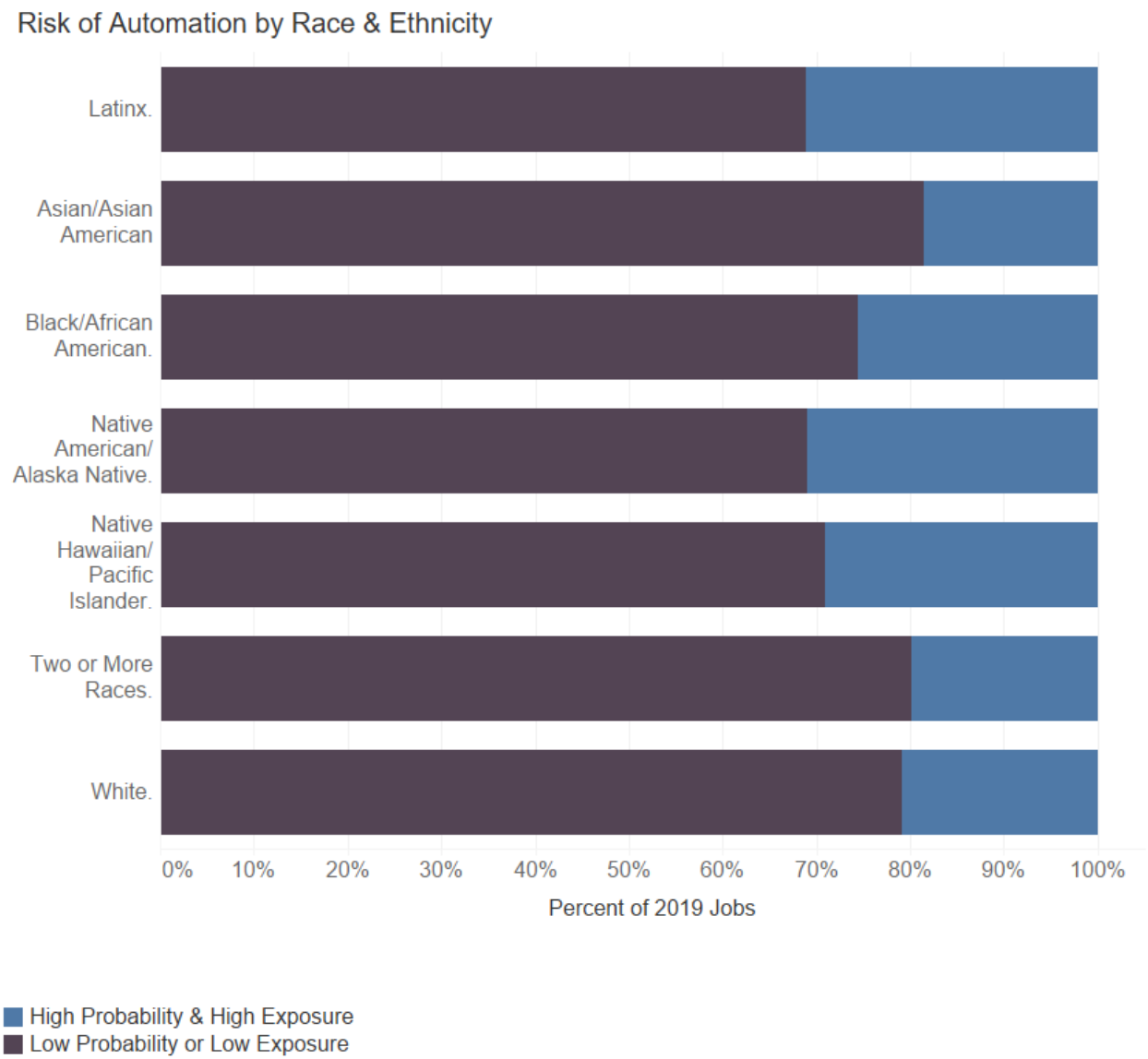

Figure 4. Risk of Automation by Race [17,19,24, ++]

++High risk of automation is defined as both having a high estimated probability of automation (Frey & Osbourne, 2017) **and** high exposure to automation technology (Webb, 2019). If an occupation has low probability or low exposure, it is not considered a high risk.

As we can see in Figure 5, initial unemployment claims show that workers of color are overrepresented* in the first wave of COVID-19 layoffs. Black/African American, Native American/Alaska Native, and Native Hawaiian/Pacific Islanders have experienced higher rates of layoffs than their representation in the workforce. A jobless recovery means that many of these workers' jobs will not come back.

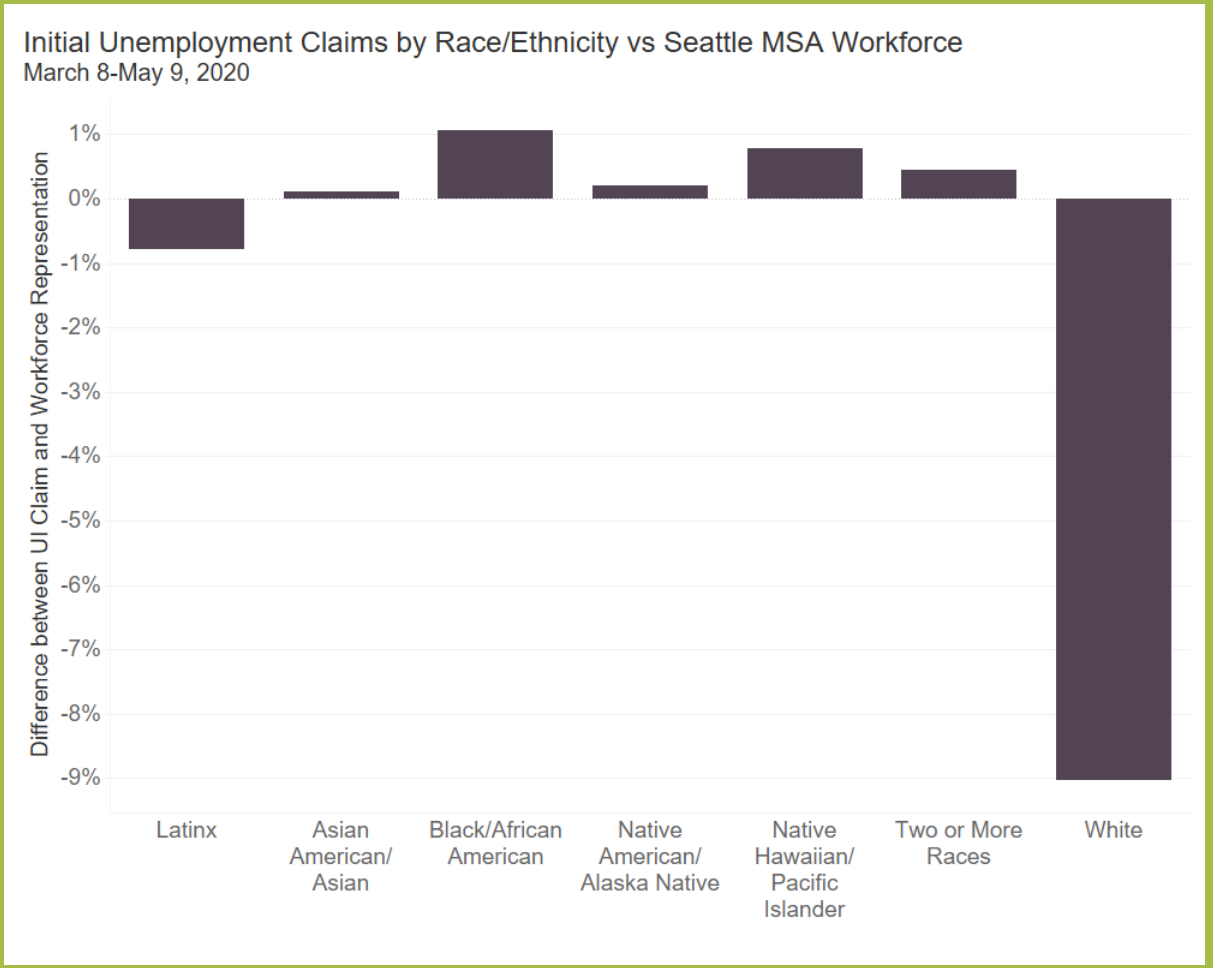

Figure 5. Initial Unemployment Claims by Race & Ethnicity

*Latinx workers are not. This is likely because Latinx workers are over-represented in essential occupations.

Impacts by Educational Attainment

The overrepresentation of workers of color in both jobs at the highest risk of automation and initial unemployment claims is consistent with workers of color facing structural barriers to educational attainment, among other obstacles. We see in Figure 6 that occupations that require no formal education, a high school diploma, postsecondary nondegree award, and associate's degree are much more at risk of automation than occupations that require some college or a bachelor's degree or above.

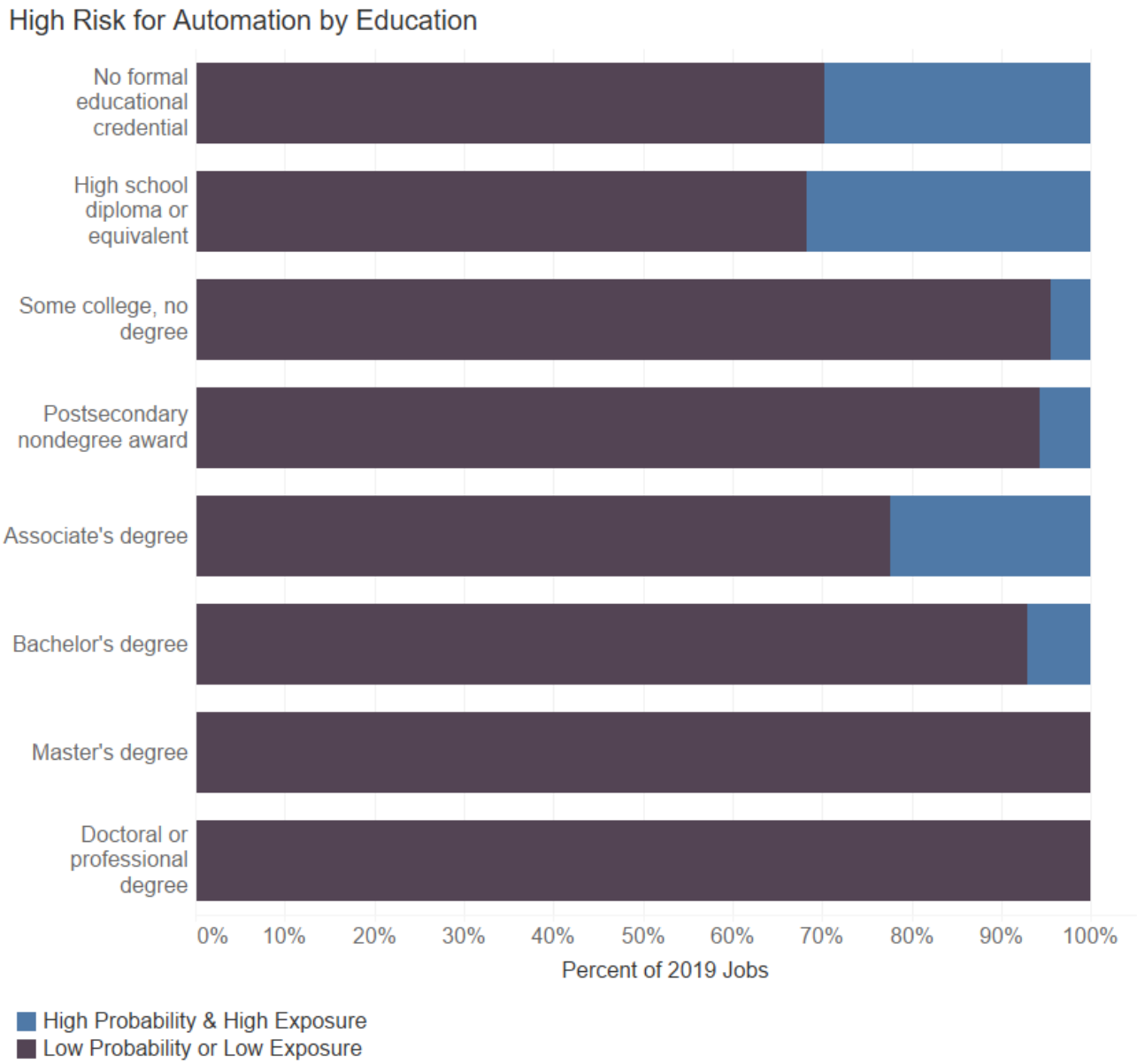

Figure 6. Percent of Jobs at Risk of Automation by Education

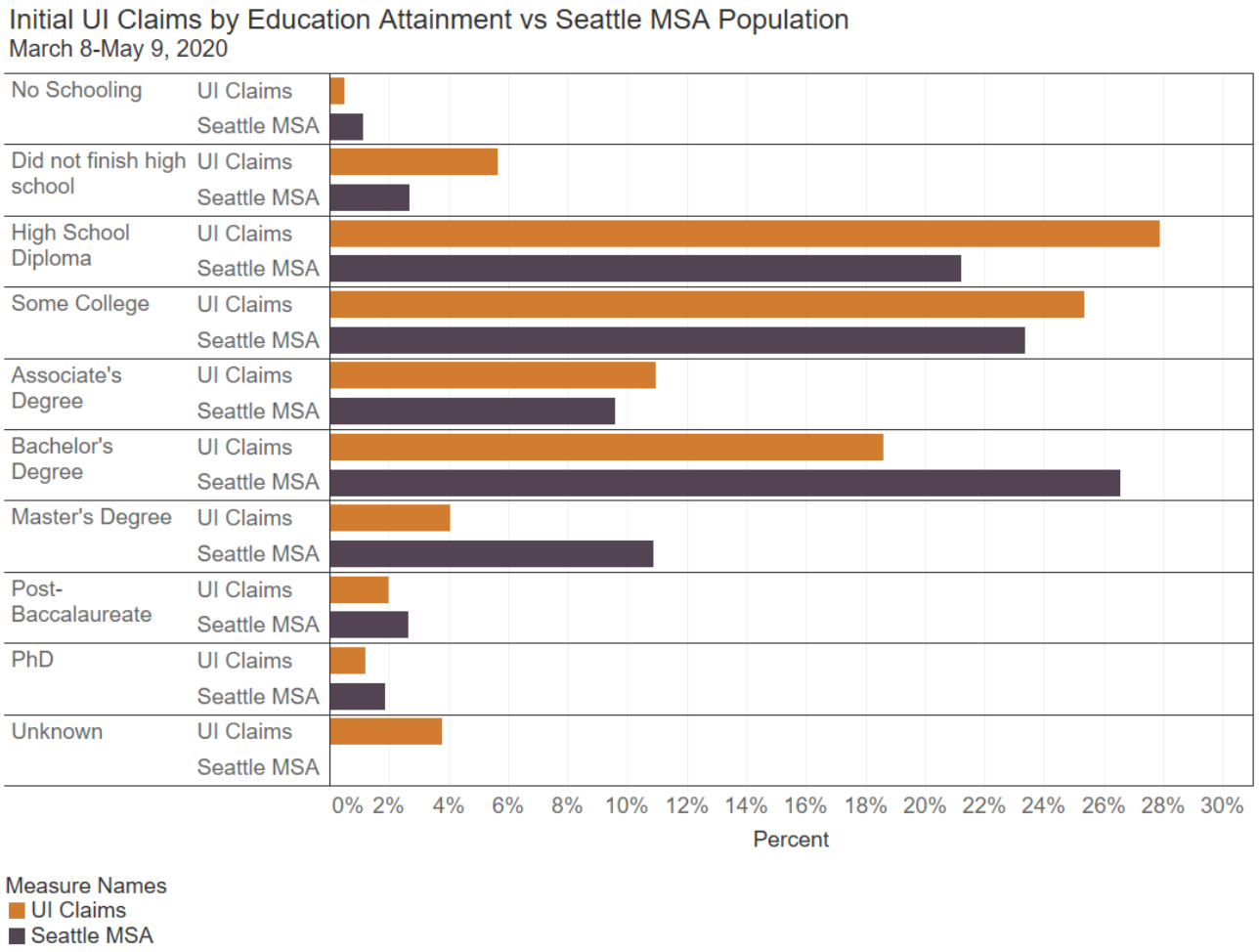

Figure 7. Percent of Jobs at Risk of Automation by Education [13, 24]

In the initial round of COVID-19 layoffs, those working in jobs that require lower levels of education are much more likely to experience reduced hours or layoffs or work in environments with exposure to COVID-19.[25] Those with less than a bachelor's degree are claiming UI at much higher rates than those with a bachelor's degree or more (Figure 7). Many of these jobs will return with the loosening of physical distancing restrictions, but not all will. Workers with lower educational attainment may be less prepared to shift to other jobs that may emerge during this period of transition.

Skills Needed in the Network Economy

The skills necessary to succeed in the Network Economy are proving their value now. **The COVID-19 crisis has already demonstrated how businesses are utilizing their workforce's Network Economy competencies to adapt their business models to changing circumstances and consumer demand.**

As described below, the Network Economy will require the widespread development of new skill-sets in the workforce, specifically:

1) Digital Skills
2) Adaptability
3) Socio-emotional skills
4) Creativity

Currently, these skills are mainly emphasized and developed in postsecondary education programs and in the higher-skill occupations to which they lead. This leaves many workers without postsecondary education (see Figure 6 and 7 above) and working in lower-education occupations more vulnerable to disruption.

Digital Skills

The amount of digitally mediated work has grown significantly in the past twenty years, as seen in Figure 8, below. In 2002, most occupational categories were composed of "low digital skills" jobs. **Today, digital work has increased across nearly all occupational categories, but particularly in those made of low digital skills jobs, thus raising the bar for entry for lower-education workers.**[26]

Despite the growing sophistication of digital tools, the digital skills that are and will be in the highest demand in the Network Economy are overwhelming mid-range. While demand for advanced skills—namely, those used in computer programming—will grow, most occupations will require being proficient with basic office software or using occupation-specific software (e.g., electronic medical chart programs). It is critical to integrate such mid-range skills into training and education.[27]

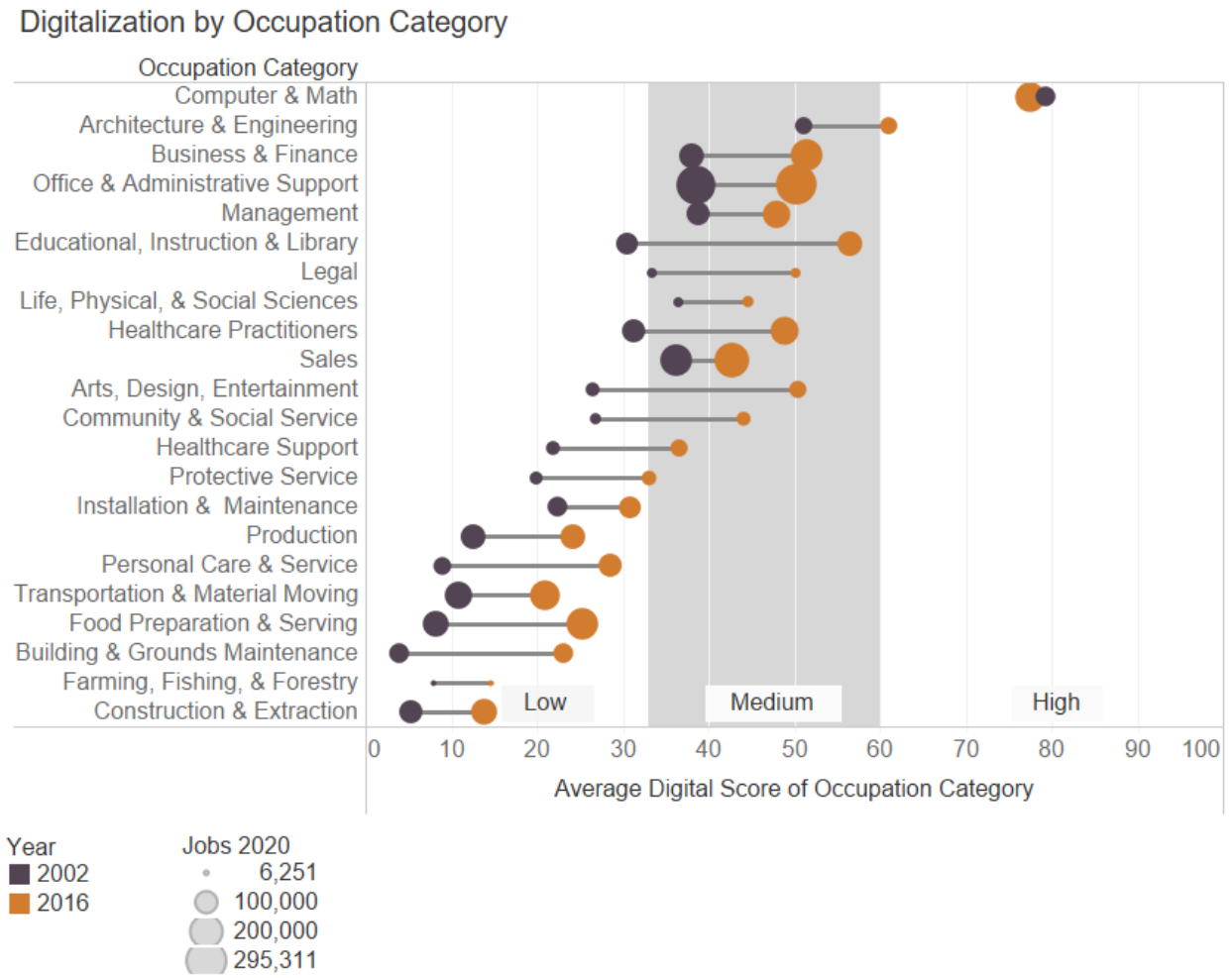

Figure 8. Digitalization of Work (adapted for Muro et al.)[24,26]

The most critical digital skills gap in the Network Economy are entry-level skills for those who currently have limited digital access or literacy. These workers face being shut out of the economy entirely as occupations that were formerly accessible to them increasingly require, at minimum, the ability to communicate via email and navigate basic office software. These workers already face significant barriers, including being from low-income households, being English Language Learners, having a history of justice involvement, and other obstacles that make it more difficult to secure skills and employment.[28]

There are several digital literacy assessments and courses that could help bridge both the entry-level and midrange skills assessment needs and gaps. **However, there is no agreed-upon standard, leaving workers and employers without a clear signal about what assessments and training programs are worth the time, effort, and expense.** [28]

Adaptability

The rate of technological change and the changing nature of the labor market in the Network Economy mean that adaptability and life-long learning skills are paramount. Training for adaptability starts in K-12 education—where ideally students are taught not merely the core curriculum but how to learn independently—and extends to postsecondary programs and the entire workforce development system. Workers will need to be able to re-enter formal instructional settings to meet the changing demands within the workplace. **They will need to know how to identify their own skills and knowledge gaps as well as how to seek out resources and individuals with whom to collaborate to fill those gaps.** For example, in manufacturing, it was once typical to have expertise in only one step of the process. Today production employees are often expected to work in multiple stations and in collaboration with other workers to accommodate more flexible operations.

The Internet and the advent of Massive Open Online Courses (MOOCs) and other asynchronous online learning opportunities have dramatically expanded opportunities for individuals to learn new content and skills. However, it will take a more robust and coordinated system of life-long learning opportunities to build a workforce that can adapt to a new economic paradigm. And workers, particularly those with lower educational attainment and independent learning skills, will need resources and support to access life-long learning opportunities to help them adapt as their jobs change.

Social-emotional skills will be paramount for connecting and collaborating effectively, particularly when that connection is via online communication platforms such as Zoom, Slack, and email.

Social-Emotional Skills

In the Network Economy, people can work remotely but together on a scale and speed that was unimaginable pre-Internet. Connecting and collaborating with more people who think differently and have different experiences increases the potential for innovation because it expands the universe of the adjacent possible, or what can come next, based on what is currently known or done.[10] Social-emotional skills will be paramount for connecting and collaborating effectively, particularly when that connection is via online communication platforms such as Zoom, Slack, and email.[29]

Creativity

The Network Economy offers the opportunity for humans to focus on creative and innovative work as robotics and AI take over the more routine physical and cognitive tasks. Creative or innovative endeavors start from what exists and seek to make something new. As social media networks demonstrate, network dynamics have a strong influence on the development and spread of ideas. Networks gain their strength and value through participation and are an example of the notion of the whole being greater than the sum of its parts.

Creative skills, the conventionally artistic or craft skills as well those that are digitally-mediated, improve individuals' well-being.[30] A robust creative workforce and the presence of a vibrant arts and culture scene are essential components of a livable and inclusive city.[31,32] **Creative thinking and creative problem solving are transferable skills that can be sharpened and honed.** They allow people to thrive via self-expression and connection to community, whether that is an ethnic or an artistic one. They can also be applied to technical and scientific problems, a key driver of innovation.

STRATEGIES TO PREPARE SEATTLE'S WORKFORCE FOR THE NETWORK ECONOMY DURING COVID-19 RECOVERY

Local and regional workforce investment is critical to both supporting regional economic competitiveness and achieving equitable socioeconomic outcomes for marginalized communities. **This is particularly true as employer investments in training have been reduced. While relatively limited in size, local public sector investment can have a major impact on driving an equitable recovery that also helps workers transition to the Network Economy** by focusing on solutions that meet the following three criteria:

- Address gaps in existing public workforce programs and investments which often favor workers with fewer barriers to employment and focus on traditional sectors.
- Promote an equitable recovery for workers and businesses by targeting communities of color (including immigrants and refugees), returning citizens, and persons facing homelessness.
- Serve a dual purpose of supporting short-term recovery efforts while simultaneously preparing the workforce for the Network Economy.

During the Great Recession, despite the best intentions, the federal workforce system left behind significant numbers of impacted workers during the recovery. Training programs focused on raw numbers of workers assisted rather than those with the most need, job training programs were often not aligned with industry needs, and tighter state workforce budgets forced the closure of one-stop centers often to the detriment of underserved communities.[33]

COVID-19 is compounding ongoing workforce system challenges. Postsecondary education and workforce systems continue to struggle in response to the need for physical distancing. The speed and intensity of layoffs have overwhelmed unemployment systems, WorkSource sites have closed with few resources for virtual job-seeker engagement, and colleges have struggled to move to a completely online environment. **The very systems needed to prepare the workforce for the Network Economy are themselves struggling with the rapid scale of disruption caused by the pandemic.**

Given the above criteria and the impacts of the global pandemic on Seattle's economy, there are three areas in which funds can be braided and invested to meet the dual goals of addressing the immediate needs of those workers displaced by the pandemic and preparing them for the Network Economy:

Deploy intensive, rapid digital literacy programs supported by digital resources and credentials endorsed by both industry and the public sector.

Support systemic on-ramp programs connecting lower-skill workers to in-demand career pathways, such as the healthcare and technology sectors.

Support intensive virtual career navigation services for graduating high school seniors and opportunity youth, connecting them to funded virtual and hybrid postsecondary programs.

Deploy Intensive, Rapid Digital Literacy Programs Supported by Digital Resources and City- and Industry-Endorsed Microcredentials

Digital skills will be broadly needed for participation in the Network Economy. COVID-19 exacerbated the impact of the critical entry-level digital skills gap. Workers with low digital skills—who may also lack digital resources (computers and Internet access)—may be unable to apply for new jobs, engage in online learning, or succeed in evolving work environments requiring the use of technology. **Seattle should invest in a post-COVID-19 digital skills campaign to help bridge the digital divide for thousands of currently unemployed residents as well as workers whose lack of digital skills and access places them at greater risk of job disruption in the Network Economy.** Investment should support the following efforts:

1) Access to affordable high-speed Internet to conduct job searches, conduct video job interviews, and participate in online learning.

2) Distribution of free or low-cost (subsidized) recent-model computers and tablets with up-to-date operating systems and the ability to access online tools and sites.

3) Availability of technical support supplemented by self-paced learning modules to improve digital skill capacity.

4) Development or endorsement by the City and local industry of microcredentials that serve to demonstrate workers' digital literacy skills.

For employers, high school diplomas often serve as a proxy for literacy and numeracy competencies, yet a similar proxy for digital literacy competencies is lacking. Several European countries have created digital literacy skills standards that could be adapted for local use.[34] Pairing these standards with an associated assessment and microcredentials** provides workers with valuable digital skills and employers a marker of an applicant's skills. **Public-private partnerships should focus on gaining industry endorsement of digital literacy microcredentials.**

**Often called "badges," microcredentials allow individuals to complete very short-term training to gain a portable certification that, ideally, is recognized by employers. Workers can upgrade their technical and employability skills in response to changing job requirements and do so quickly, learning while continuing to work.

Support Systemic On-Ramp Programs

Workforce development stakeholders often focus on supporting "last mile" programs that lead directly to sustainable-wage careers for those with higher skills and job-readiness. However, as a recent report from the Strada Education Network noted, **more than 32 million Americans cannot access these programs**,[35] and this problem will only be exacerbated as the range of skills demanded increases in the Network Economy. **On-ramp programs can address these opportunity gaps by providing lower-skill individuals the foundational skills necessary to prepare and qualify for higher-level workforce training, along with connections to wrap-around supports and financial resources to address barriers.**

Washington State provides an excellent resource with I-BEST programs at Community and Technical Colleges.[36] Still, in Seattle as elsewhere, on-ramps are more likely to be siloed programs rather than systemic. A system of on-ramps means they are connected with higher-level education and training programs and coordinated with these to meet local labor market demand; that they are accessible to historically underserved populations; and that they are connected to critical supportive services. A strategic effort to develop and sustain a system of on-ramps leading to opportunities in multiple sectors of the Network Economy coupled with connections to communities throughout the region can bridge the opportunity gap for thousands in the Seattle region. The Strada report[35] on the effectiveness of on-ramp programs identifies opportunities for Seattle policymakers, including:

1) Advancing on-ramps as robust talent pipelines to local employers, thereby encouraging employer involvement in their development and funding as well as creating demand for graduates to fill first and entry-level jobs on a career pathway. **This will require that supported on-ramp programs include robust and appropriate digital skills training and competency development to meet the needs of employers.**

2) Investing in support services for individuals in on-ramp programs, as well as extended support services (beyond job placement and short-term retention) to help individuals move from entry-level to sustainable-wage employment. These support services must be robust,[++] as supporting those furthest from opportunity requires more per-person investment. But the long-term return on investment is substantial.

3) Supporting the improvement and coordination of data collection and evaluation of on-ramp programs to demonstrate the return on investment of public investment, including the economic benefit for employers in Seattle.

**Robust wraparound services address the multifaceted nature of the barriers to full participation in training and in the workforce many individuals face and are adequately funded and navigable so that those barriers can be effectively addressed. This includes but is not limited to adequate housing support, childcare, and mental and physical healthcare. Often these supports are nominally available but are difficult to access and the amount of funding available does not fully address the underlying barrier. For example, a typical emergency rental assistance limit is $800 and requires documentation that other sources of assistance have been exhausted whereas the median rent in the Seattle region is nearly $1,500.

Intensive Virtual Career Navigation Services for Graduating High School Seniors and Opportunity Youth, Connecting Them to Virtual and Hybrid Post-Secondary Programs.

The graduating high school classes of 2020 and 2021 in Seattle face an uncertain future in the wake of COVID-19, with high unemployment rates for youth and those with lower educational attainment. COVID-19's disruption of the standard pathways from high school to postsecondary training and education increases the likelihood for these graduates to become disconnected from institutions—K-12 and high education—during the transition and get derailed from their education and career plans. And it is more difficult for opportunity youth—youth who are not currently pursuing education or working—to re-engage with training and education.

With fewer job opportunities, it is essential to increase support for those graduating and opportunity youth to connect to further education and training as a gateway to success in the Network Economy. Youth will need guidance to navigate new resources and pathways as they come online so they can pursue opportunities to develop essential skills—digital skills, adaptability, social-emotional skills, and creativity—and credentials that best prepare them to fully participate in the Network Economy.

Fortunately, today there are more financial supports for postsecondary education than in the past. The Seattle Promise program[39] and the Washington College Grant[40] make attending community college, university, or apprenticeship affordable for many students. These programs can be combined with traditional financial aid to cover not only the cost of education but offset living costs as well. **However, without investments in career navigation, underrepresented students are less likely to apply for financial aid and understand how they can attain their career goals through online learning in higher education programs.**

Virtual career navigators connect with students individually and pro-actively to assist with:

1) Understanding which college programs may be a good fit for their interests and labor market demand that are available online at community and technical colleges.

2) Completing the FAFSA or WAFSA to obtain Federal Pell grant assistance AND supplemental funding from the newly available Seattle Promise program and Washington College Grant.

3) Supporting application to and enrollment in a local community college and connecting students to a college-based mentor or advisor to reach out to for support.

FUTURE AREAS OF RESEARCH

As the COVID-19 crisis evolves and the journey to the Network Economy continues, additional policy research areas for consideration may include:

1) Innovations to local dislocated worker services and systems to decrease the time between jobs for individuals who experience job loss due to automation.

2) As more specific Federal and State responses emerge to the COVID-19 outbreak, exploring how the City can align its efforts to create maximum impact for local employers and workers.

3) How to design and expand work-based learning.

4) Understanding state and local unemployment data as it becomes available.

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