



Statement Before the House Select Committee on Economic Disparity and Fairness in Growth  
On Our Changing Economy: The Economic Effects of Technological Innovation, Automation, and the Future of Work

# **A Dynamic Economy Requires a Dynamic Workforce**

Investing in Human Capital, Human Skill, and Human Work

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November 3, 2021



Mr. Chairman and members of the committee, I am pleased to have the opportunity to address the rapidly changing landscape of technological innovation, the trend of automation, and the future of human work in the context of the ongoing technological transformation of the economy.

There's an important and, I believe, somewhat neglected contextual framework to these issues. What can we say with relative certainty about the changing skill demands of the American economy?

For decades, dating back to the Dwight D. Eisenhower administration, the focus of government, business, education, and learners has been on increasing the supply of the so-called STEM skills—science, technology, engineering, and math. There's no question that technical skills are vital in a high-technology economy and that, despite all our effort, there is still substantial unmet demand for individuals with these skills.

However, another parallel story has to be considered in shaping workforce development policy. According to an analysis of Census Bureau data by Harvard Professor David Deming, one of the effects of automation and technology has been to increase demand for workers who have both high levels of technical skill and, counterintuitively, high levels of social skills—the so-called “noncognitive” or soft skills. Wages follow a similar pattern, with the most robust wage growth going toward those who combine high technical and high social skills.<sup>1</sup> These findings, I would add, are echoed when employers are asked what's missing in the workforce: foundational skills such as communication, teamwork, critical thinking, collaboration, grit, and perseverance. Most employers will say they can train for technical skills but have far more difficulty training for the noncognitive skills.<sup>2</sup>

Aside from their immediate utility, noncognitive skills are important for another key reason. Taken as a whole, they are a matrix of skills that support the acquisition of new skills. In a world where employer skill demands can be transformed seemingly overnight, this kind of flexibility and adaptability represents the “master skills” of the 21st-century economy. These noncognitive skills allow workers to pivot more easily into new jobs as automation increasingly takes over routine, task-based skill sets.

The labor shortage associated with the recovery from the COVID-19 recession will likely accelerate demand for both high-tech and “master skills” going forward. Labor shortages and rising wages will increase the incentives for automation as firms seek to remain competitive both



locally and globally. More automation means required skills will likely tilt even further toward skill sets that are more difficult to automate, those made up of non-routine tasks and tend to incorporate greater social and interpersonal agility. Workers who have those types of skills, as I noted earlier, will likely also be best prepared to adapt to the changes in skill demand that automation is bringing forth. Conversely, those who struggle with noncognitive skills will be at a disadvantage in finding work and keeping up with the pace of change.

In light of an increasingly automated economy, the solution is not to attempt to constrain technological change or alter its course, but rather to build up the capacities of our workforce in both technical and noncognitive domains while technological change continues to run its course. Policymakers at all levels should emphasize noncognitive skill development through a variety of approaches to help increase the supply of these skills and help equip workers with the full portfolio of capacities they will need to thrive both today and in the future.

### **The Imbalance of Technical and Noncognitive Skills**

The past few decades of scientific and engineering innovation have led to an unexpected result. An economy driven increasingly by artificial intelligence and automation is accelerating the demand for noncognitive skills.<sup>3</sup> Technology of all sorts is replacing manual and technically focused human labor, while advancing much more slowly in people-intensive activities. The result is that the highest and most consistent labor market returns are accruing not to individuals who have narrow, technical competencies but rather to those who combine technological fluency with high levels of noncognitive skills.

In a 2018 American Enterprise Institute report “STEM Without Fruit: How Noncognitive Skills Improve Workforce Outcomes,” I argue that a serious imbalance has developed between US education and training priorities and the actual needs and demands of the American economy.<sup>4</sup> Data from the Bureau of Labor Statistics show that STEM-related occupations amount to a small portion of the total US workforce and are likely to remain comparatively small as a share of the total economy and that the highest economic returns are actually in occupations that require high levels of noncognitive skills. For better or worse, the vast majority of Americans are and will continue to work in fields unrelated to STEM. As automation continues to take over routine work, those with strong “people-facing,” noncognitive skills are best positioned to take advantage of emerging work opportunities and promising careers.

Figure A: The Evolving Nature of Skills Demand

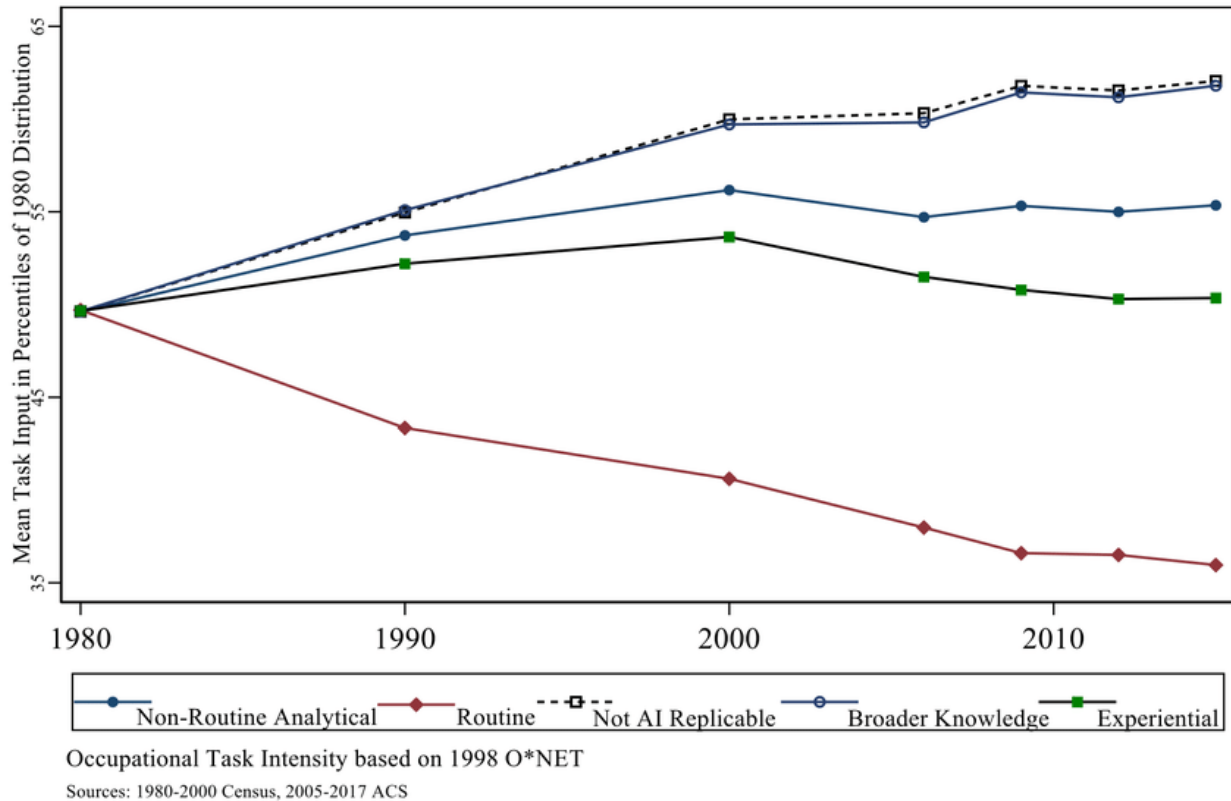
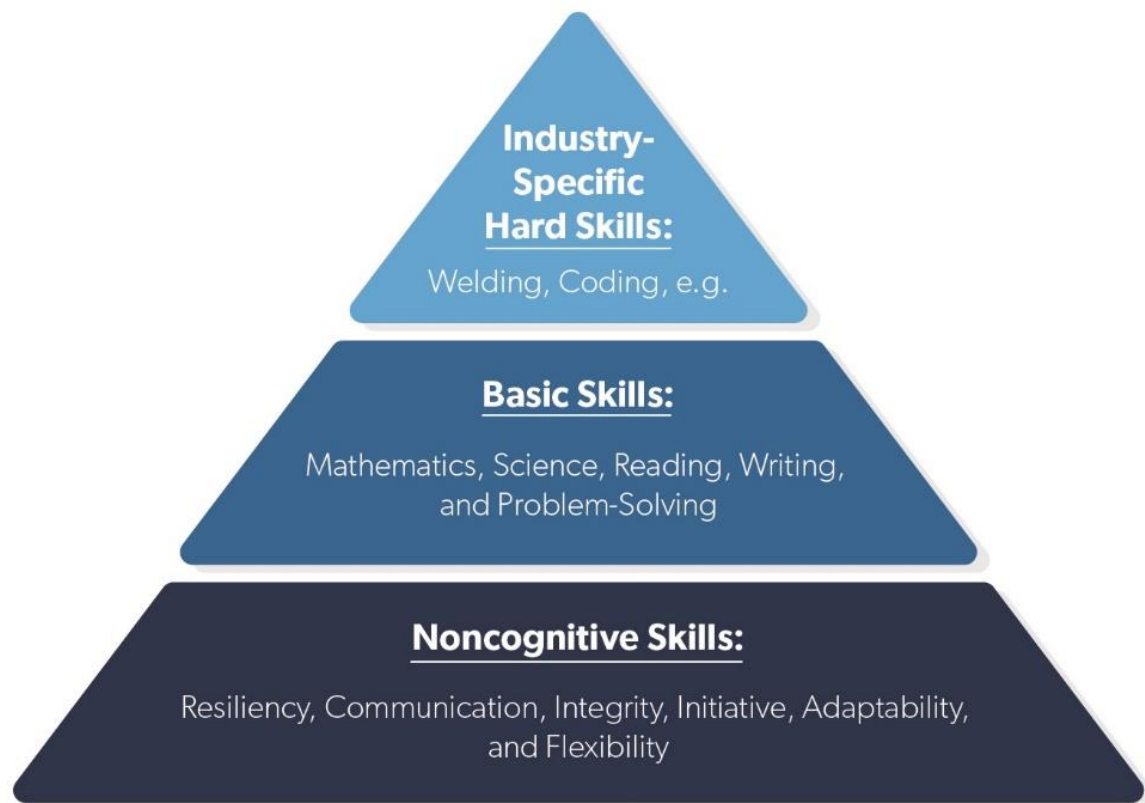


Figure A demonstrates the decline in routine tasks and the parallel increase in non-artificial-intelligence-replicable skills, which are also known as human skills and are ones that humans maintain a comparative advantage in vis-à-vis technology.<sup>5</sup> It is clear from the represented data above that tasks are evolving quickly to put a premium on noncognitive skills and, more specifically, a mixture of noncognitive and technical skills. The consensus among these business and organization leaders is that “in the age of automation, adaptability rules. While maintaining technical fluency will be important, demand for soft skills will continue to accelerate.”<sup>6</sup> Survey data from employers on LinkedIn show that industry experts, organizational partners, executives, talent developers, and managers all say their top goal in 2018 was to train soft skills in employees.<sup>7</sup>

Our decades-long preoccupation with industry and skill specialization has been a two-edged sword, making it easier in some ways to get a job but harder to build a career.<sup>8</sup> Figure B helps illustrate this conundrum. The foundation of a career in even a highly technical STEM field like

software engineering is a set of noncognitive skills that are necessary for every industry, including basic literacy, communication, teamwork, and critical thinking. Without these skills, no amount of technical training will be sufficient; lacking such a foundation, the technical skills simply “fall through,” which is a pretty good description of why technical skill training programs, especially those for disadvantaged populations, simply do not yield the kind of results for which their designers and implementers desire. Moreover, even if it were possible to create technical competency in such underdeveloped and ill-prepared workers, the job would likely be a dead end because of the way noncognitive skills and capacities support development and promotion on the job. In this way, both soft and hard skills are necessary for workforce preparation, but hard-skill development rests on a foundation of noncognitive skills.

*Figure B: Noncognitive Skills Are the Foundation for Technical and Industry-Specific Skills*



Further evidence from “STEM Perspectives: Attitudes, Opportunities, and Barriers in America’s STEM Workforce”, an AEI report published in July 2020, helps illustrate the role noncognitive



skills play in sustaining workforce engagement.<sup>9</sup> According to survey data, just 35 percent of younger STEM workers, those at the beginning of their careers, say communications skills and interpersonal skills are extremely important, while 55 percent of older STEM workers say getting along with other people is an extremely important part of their jobs. Likewise, STEM workers who make less than \$75,000 a year are less likely than are those making \$150,000 or more per year to say good communication and interpersonal skills are extremely important for their jobs.

The lesson seems clear: A technical skill can help you get a job, but noncognitive skills are necessary to building and sustaining a career. An exclusive focus on specialized knowledge and skills, to the exclusion of more general knowledge and skill development, builds one-dimensional workers who often have trouble pivoting to new technology and advancing along career paths that require complex, multidimensional problem-solving and people management capacities.

### **Investing in Noncognitive Skills**

Solving our nation's noncognitive skill deficits is the key to achieving complementarity between human and machine in an automating economy. The solutions for building noncognitive skills, however, are more complex. The acquisition of noncognitive skills is like dropping grains of sand into a bucket, accumulating slowly across long periods of time through multiple social inputs: family, schools, religious groups, sports leagues, and community organizations. Such a gradual developmental process makes it difficult to isolate and address weaknesses and design interventions that work. Noncognitive skills often feel like they are everywhere and nowhere at the same time. In contrast to technical skills, which can be broken down into sequenced curriculum and shaped by formal teaching strategies, noncognitive development is constantly "in play," beginning before infants can speak or walk.

The long trajectory of noncognitive skill development points to the fact that employer-identified deficits are an outgrowth of the broader challenges in American society. Social capital and relationships that tie us to others are fundamental forces of the world we live in, and these forces are critical to the development of noncognitive skills.<sup>10</sup> As institutions like the family and civil society have come under increasing stress, social connection has frayed. This environment has reduced opportunities for people to develop the habits and skills required for effective formal education and noncognitive skill development.



Targeting and developing noncognitive skills with this backdrop is difficult and uncertain terrain with which policymakers must grapple. What do we do about something so important and yet so intangible at the same time? In recent years, schools have responded to the challenge by incorporating “social-emotional learning” into teaching strategies, but the jury is very much out on how effective this approach is.<sup>11</sup> Others have emphasized the importance of focusing on care for infants and very young children as the keys to preventing these deficits before they start. In my previously referenced report, “STEM Without Fruit,” I pointed to a variety of program strategies for contending with noncognitive deficits across the life cycle.

What we cannot afford to do is allow the challenging nature of the topic to defeat us before we even begin to consider it seriously. To do so would be a disservice to the millions of Americans whose opportunities are severely constrained by noncognitive deficits and to our broader society and economy, which depend on these skills for continuing development. While the economic and social future is unpredictable, the demand for noncognitive skills is perennial.<sup>12</sup>

### **Investing in Successful Model Programs**

To overcome the challenge of the diffuseness of noncognitive skills, it’s important that we look to organizations and approaches that are working, in real time, to address the problem. If replicated well, they may hold the answer to thriving in the labor economy of the future.

Several sector-focused workforce development programs have deployed models that seek to integrate noncognitive and technical skill training to improve work readiness and assist workers in advancing into higher-wage occupations.<sup>13</sup> In a randomized controlled trial design, one organization, Per Scholas, combined information technology training with resume and interview assistance and pre-employment coaching. The evaluation’s findings showed positive economic effects in Per Scholas participants. The soft-skill development components demonstrated success in assisting low-income workers in gaining, sustaining, and advancing through higher-paid careers.

The Federation for Advanced Manufacturing Education (FAME) program, a two-year, apprenticeship-style program that combines intensive technical skill and soft skill development in program participants, has also demonstrated success. First developed in a Kentucky Toyota plant to address local skills gaps, the program’s dramatic results have led to its rapid adoption by many other employers in multiple states. As of fall 2019, the program boasted 33 chapters in 13 states. The program has developed a highly replicable, on-the-job training model for developing noncognitive skills, such as timeliness and communication, and higher-order competencies, such



as critical thinking and problem-solving. Each week, students alternate time in class and on the job with their sponsoring employers, which allows them to apply what they learn in real time. FAME’s model emphasizes certain flexible, teachable, and repeatable tasks that might be scaled for other industries outside of manufacturing and succeeds at doing so through its use of work-based learning.

Economic Mobility Pathways (EMPath) is an international charitable organization that works with low-income families to help them reach economic independence. It has developed a new evidence-based economic mobility coaching model that creates substantive earnings gains for unemployed and low-wage workers. Based on emerging evidence from neuroscience about how poverty, trauma, and systemic disadvantage affect human behavior and decision-making, EMPath braids together 21st-century skills and economic mobility coaching. The EMPath “coaching” approach helps families develop critical noncognitive skills they need to navigate the rapidly changing world of work.

Policymakers, educators, and researchers cannot afford to ignore the increasing importance of nurturing these skills in students and employees. Investing in programs like these can provide a robust starting point from which to develop and improve noncognitive skill education among those struggling in a rapidly shifting workforce and support replication of existing programs that have demonstrated success in helping workers address these critical capacities. It truly is a mixture of technical and noncognitive skills that enables the most workforce flexibility and best career outcomes. By focusing on developing a solid foundation of noncognitive skills, however, we can help equip our citizens with all the skills they need to find, keep, and advance in meaningful human work to support themselves and their families.

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<sup>1</sup> David J. Deming, “The Growing Importance of Social Skills in the Labor Market” (working paper, National Bureau of Economic Research, Cambridge, MA, August 2015), <http://economics.mit.edu/files/11112/>.

<sup>2</sup> Brent Orrell, “STEM Without Fruit: How Noncognitive Skills Improve Workforce Outcomes,” American Enterprise Institute, November 14, 2018, <https://www.aei.org/research-products/report/stem-without-fruit-how-noncognitive-skills-improve-workforce-outcomes/>.

<sup>3</sup> Deming, “The Growing Importance of Social Skills in the Labor Market.”.

<sup>4</sup> Orrell, “STEM Without Fruit.”

<sup>5</sup> Nancy Buchan & Elizabeth Ravlin, and Orgul Ozturk, “Changes in Globalization: How Should IB Education Respond?,” AIB Insights, 2020, 10.46697/001c.13433.

<sup>6</sup> Thomas Buus Madsen, “Learning at the Point of Need: 3 Essential Aspects,” LinkedIn, March 8, 2018, <https://www.linkedin.com/pulse/learning-point-need-3-essential-aspects-thomas-buus-madsen/>.



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- <sup>7</sup> Benjamin Spar et al., “2018 Workplace Learning Report,” LinkedIn, 2018, <https://learning.linkedin.com/content/dam/me/learning/en-us/pdfs/linkedin-learning-workplace-learning-report-2018.pdf>.
- <sup>8</sup> Brent Orrell, “Why Students Should Forget the Coronavirus Gap Year to Take an Essential Job Instead,” *USA Today*, June 5, 2020, <https://www.usatoday.com/story/opinion/2020/06/05/why-students-can-learn-more-essential-job-than-gap-year-column/3143208001/>.
- <sup>9</sup> Brent Orrell and Daniel A. Cox, *STEM Perspectives: Attitudes, Opportunities, and Barriers in America’s STEM Workforce*, American Enterprise Institute, July 15, 2020, <https://www.aei.org/research-products/report/stem-perspectives-attitudes-opportunities-and-barriers-in-americas-stem-workforce/>.
- <sup>10</sup> Brent Orrell, “Promoting Marriage Is Good Social Policy,” RealClearPolicy, March 15, 2019, [https://www.realclearpolicy.com/articles/2019/03/15/promoting\\_marriage\\_is\\_good\\_social\\_policy\\_111122.html](https://www.realclearpolicy.com/articles/2019/03/15/promoting_marriage_is_good_social_policy_111122.html); and Brent Orrell and Caleb Seibert, “What Will the ‘Ties That Bind’ Look Like After COVID?,” RealClearPolicy, May 7, 2020, [https://www.realclearpolicy.com/articles/2020/05/07/what\\_will\\_the\\_ties\\_that\\_bind\\_look\\_like\\_after\\_covid\\_490942.html](https://www.realclearpolicy.com/articles/2020/05/07/what_will_the_ties_that_bind_look_like_after_covid_490942.html).
- <sup>11</sup> Jal Mehta, “How Social and Emotional Learning Can Succeed,” American Enterprise Institute, May 27, 2020, <https://www.aei.org/research-products/report/how-social-and-emotional-learning-can-succeed/>.
- <sup>12</sup> Brent Orrell, “Embracing Radical Uncertainty,” *Law & Liberty*, October 31, 2019, <https://www.aei.org/articles/embracing-radical-uncertainty/>.
- <sup>13</sup> Brent Orrell, “Minding our workforce: The role of noncognitive skills in career success,” American Enterprise Institute, May 18, 2021, <https://www.aei.org/research-products/report/minding-our-workforce-the-role-of-noncognitive-skills-in-career-success/>.