

**Investing in People for Long-Term Prosperity
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**Jeffrey M. Lacker
President
Federal Reserve Bank of Richmond**

Charleston, South Carolina

Good evening. It is a pleasure to be here in Charleston and get a taste of the region's economic dynamism, from its burgeoning tech sector to aerospace manufacturing to advanced research on renewable energy. (Of course, the lovely architecture and excellent low-country cuisine don't hurt.) The key to this dynamism is human capital, a phrase economists use to refer to the knowledge and skills that make people productive. Investment in human capital ensures that we have a skilled workforce capable of developing and implementing new technologies, and that workers are able to reap the benefits of economic growth. I know that civic leaders in Charleston, like leaders elsewhere around the country, are acutely aware that workforce quality is a critical factor when companies are choosing where to locate new facilities. A skilled workforce thus is essential to a region's economic vitality.

This fact, along with the burgeoning research activity focused on labor market dynamics in the wake of the recent recession, has motivated us at the Richmond Fed to survey what the economics literature has to say about enhancing workforce skills. This evening, I'd like to talk about several key elements in a comprehensive, research-based approach to improving human capital investment: providing students with a better understanding of college preparedness; informing them about multiple career and postsecondary education options; and laying the foundation for success with early childhood education. Before I discuss these ideas in more detail, I must note that these are my own views and should not be attributed to anyone else in the Federal Reserve System.¹

The Impact of Technology

Twenty-five years ago, nearly 25 percent of South Carolina's workers were employed in manufacturing, many of them in textile mills that moved south from New England in the 1950s as their owners sought cheaper labor. In the 1990s, those mills were moved overseas in search of even cheaper labor, and manufacturing employment in the state declined precipitously. Today, fewer than 12 percent of South Carolinians work in manufacturing. Recently, however, the state has experienced a resurgence of advanced manufacturing, and the value of the goods produced in the state has increased even as employment has declined.

The factories producing airplane components and ballistic-resistant cars don't look much like the factories of old. You might have heard the adage that the factory of the future will have only two employees: a man and a dog. The man will be there to feed the dog, and the dog will be there to keep the man from touching the equipment.² That's a bit of an exaggeration, but it's true that

today's factories employ far fewer people than they used to, and those people often must have specialized training to operate complex computer-controlled machinery.

When new technologies increase the demand for skilled workers who can operate those technologies, economists refer to it as “skill-biased technical change.” Because it takes time for people to learn new skills, this increase in demand initially leads to higher wages for skilled workers relative to less-skilled workers. But as the higher wages spur more people to obtain the necessary education, the supply of skilled workers tends to respond to the demand, and the wage differential tends to narrow.

Economists Claudia Goldin and Lawrence Katz have documented this dynamic — the “race between education and technology” — throughout the 20th century in the United States.³ In the early 1900s, new technologies such as typewriters and adding machines created a new class of white-collar clerical jobs that required a high school education. Because few people had a degree, these jobs paid about twice as much as jobs that did not require a high school degree.⁴ The response was a dramatic increase in high school graduation rates. Between 1910 and 1940, the number of 19-year-olds in the United States with a diploma increased from 9 percent to 51 percent.⁵ Over that same time period, the wage premium associated with high school completion collapsed.

In the latter half of the 20th century, as the computer revolution took hold, demand for college-educated workers began to rise, and hence their relative wage rates rose as well. As one would expect, there has been an increase in the number of people with a college degree. In 2014, about 32 percent of adults over age 25 had at least a bachelor's degree; in 1980, that number was only 17 percent.⁶ And yet, the “college premium” has continued to increase: In 1980, the average worker with a college degree or higher earned about 40 percent more than the average worker with only a high school diploma. In 2014, the college-educated worker earned about 80 percent more.⁷ The inescapable conclusion is that we are failing to keep pace with our economy's growing demand for skilled workers.

The Importance of Human Capital

We should be concerned about this for two reasons. First, it has implications for long-run growth in standards of living. There is a consensus among economists that such growth occurs not only because we have more people working or more machines (or, in economic terms, more labor and more capital) but also because technological advances make existing workers more productive. Such advances might be entirely new types of machines, such as the steam engine or the transistor, or they might be new techniques for making existing products. In the 1980s, for example, the steel industry was transformed by the introduction of mini-mills, which used scrap instead of iron ore and dramatically lowered the time and cost of producing steel. (As an aside, the first mini-mill was developed by Nucor, which has a plant just up the road in Huger.)

How and why do such advances occur? There are a variety of economic forces and incentives at work, but a large body of research suggests that human capital is a critical factor. Countries with more initial human capital appear to have a greater capacity to develop new technologies and to

copy or adapt technologies developed in other countries. Skilled workers thus seem essential not only to operate new technologies but also to develop the new technologies in the first place.

The second concern is that the slowdown in the supply of skilled workers affects the distribution of income in our society. Recent data on economic inequality and economic mobility show that inequality has increased in recent years, while mobility has either decreased or remained flat.⁸ In other words, the rich are likely to remain rich and the poor are likely to remain poor. Many factors contribute to inequality and the persistence of that inequality both within and across generations. But the growing disparity in skill acquisition, often in the form of college education, appears to play a significant role.

Preparing a Skilled Workforce

Rising inequality is not the only clue that we are not adequately preparing the next generation of workers. Nationwide, about 20 percent of high school students fail to graduate within four years, and there are significant disparities in graduation rates between white students and black or Hispanic students and between students from high-income and low-income families. In some large urban school districts, as many as 40 percent of students do not graduate in four years.

A growing share of those who do complete high school now go on to college. But far too many of these students fail to earn a degree: Nationally, the college dropout rate is around 40 percent.⁹ The benefits of attending college for a few semesters without graduating are relatively small. The unemployment rate for workers with some college education but no degree is comparable to the rate for workers with only a high school degree. And while students who have attended some college do earn on average about 15 percent more than high school graduates, this pales in comparison with the average earnings of those who have completed bachelor's degrees.

There is also substantial anecdotal evidence that employers are having difficulty finding workers with the right skills. This is a common refrain on our visits to communities throughout the region, and it's supported by employer surveys. For example, in one recent study, 75 percent of manufacturers reported a moderate to severe shortage of skilled workers, such as welders, who must have strong math skills and be able to read blueprints.¹⁰ There is an ongoing debate among researchers about the actual amount of "skill mismatch" in the labor market,¹¹ but many employers certainly seem to perceive that such mismatch is real.

The key question is what can we do to increase the supply of skilled workers? The large increase in the college premium has led many policymakers and educators to advocate college for all. But as the high college dropout rate indicates, there is a big difference between enrolling in college and graduating. During focus group meetings held recently in Virginia by the Richmond Fed, representatives from four-year colleges and community colleges shared that many students are surprised to discover they lack the basic math skills necessary for college-level work. If students overestimate their readiness for college, they may be more likely to enroll in college but then drop out after they get there. That can be a costly lesson to learn; the average debt burden among college dropouts who took out loans is more than \$14,000.¹² The high college dropout rate thus

suggests that many students could benefit from more information about what is required for college success.

Of course, it's not enough to simply prescribe what students need to know; we must also help them learn it. This points to the value of improving the effectiveness of the K-12 portion of our education system. While that subject is beyond the scope of this talk, I applaud the ongoing efforts here in South Carolina and across the country to increase student achievement and close the gaps between students of different backgrounds.

I also believe we should supplement information about college preparedness with information about other career and postsecondary education options. Community colleges, for example, are a venue where students can learn more about their interests and aptitudes and hone the skills that are required for success at four-year schools. Moreover, there are a range of other post-high school educational institutions that can help students acquire the skills they need to succeed without a college degree. One factor in the high school dropout rate may be the increasing focus of many high schools on college preparation. Some students, however, may not wish to attend college or may see large barriers to doing so. If these students believe the only reason to complete high school is to attend college, they might not see much value in doing what's required to graduate. Learning about alternative career and educational opportunities that also require a high school degree could increase the perceived value of high school completion and improve their labor market outcomes relative to dropping out.¹³

On the other hand, we can do more to ensure that well-qualified students don't forgo college because of perceived obstacles such as cost or because of social norms that cause them to underestimate the potential benefits or their likelihoods of success. Researchers have found that providing these students with targeted information and assistance — a fairly low-cost intervention — can increase their matriculation rates and can play an important role in changing the beliefs of students who erroneously think they're not college material.¹⁴

So far I have discussed ways to increase cognitive skills, the specific things we learn through formal education or on-the-job training. But non-cognitive skills such as patience, work ethic and following directions also are critical. These are the skills that make it possible for us to acquire more-complex cognitive skills, and they also are critical for success in the labor market. For example, during our focus group meetings, high school teachers and administrators shared that many students did not know how to self-direct or self-motivate, skills that are critical for college success. Workforce development professionals we spoke with reported that a lack of "soft skills" was a major obstacle to employment for their adult clients. We also hear from the employers who participate in our industry roundtables that many job applicants are lacking in soft skills.

How does one acquire these non-cognitive skills? A cadre of economists and other social science researchers, led by the work of Nobel laureate James Heckman, has come to a consensus that the foundation is laid very early in life, and that it can be difficult for children who fall behind to catch up. Skill gaps are evident as early as age 5 and tend to persist into adulthood.¹⁵ The importance of early skill development also means that the return on a dollar invested in early childhood education can be much higher than the return on a dollar invested later in life. High-

quality early childhood education thus should be a crucial — and cost-effective — element of a comprehensive strategy to improve human capital investment.

Conclusion

To sum up, technological advances change the demand for skills in our economy. In recent decades, innovation has tilted demand toward more-skilled workers, and these trends seem likely to continue. An increasingly better-educated workforce thus will be essential to the long-term prosperity of a region or a nation.

Our reading of the research literature supports a balanced portfolio of human capital strategies that address the full range of educational stages and options. This comprehensive approach to human capital investment includes the following elements (in addition to enhancing the overall effectiveness of the K-12 education system):

- Informing middle and high school students about what is required for success in college;
- Informing middle and high school students about multiple postsecondary educational options;
- Providing targeted information to well-qualified students who for various reasons may overestimate the costs of a college education; and
- Investing in high-quality early childhood education.

I believe these strategies can help not only to increase our nation's prosperity but also to provide our citizens with the skills they need to share in that prosperity.

¹ I am grateful to Jessie Romero for assistance in preparing these remarks.

² This statement is generally attributed to the late Warren Bennis, a professor of business administration at the University of Southern California.

³ Claudia Goldin and Lawrence F. Katz, *The Race Between Education and Technology*, Cambridge, Mass.: Harvard University Press, 2008.

⁴ Claudia Goldin and Lawrence F. Katz, "[Human Capital and Social Capital: The Rise of Secondary Schooling in America](#)," NBER Working Paper no. 6439, March 1998; Claudia Goldin and Lawrence F. Katz, "[The Decline of Non-competing Groups: Changes in the Premium to Education, 1890 to 1940](#)," NBER Working Paper no. 5202, August 1995.

⁵ Claudia Goldin, "[America's Graduation from High School: The Evolution and Spread of Secondary Schooling in the Twentieth Century](#)," *Journal of Economic History*, June 1998, vol. 58, no. 2, pp. 345-374.

⁶ Educational attainment statistics are collected by the Census Bureau. The 1980 Census reported the share of people who had completed at least four years of college.

⁷ Based on median usual weekly earnings as reported by the Bureau of Labor Statistics.

⁸ For example, see Raj Chetty et al., "[Is the United States Still a Land of Opportunity? Recent Trends in Intergenerational Mobility](#)," National Bureau of Economic Research Working Paper no. 19844, January 2014; and Bhashkar Mazumder, "[Is Intergenerational Economic Mobility Lower Now Than in the Past?](#)" Federal Reserve Bank of Chicago *Fed Letter* no. 297, April 2012.

⁹ The National Center for Education Statistics defines college completion as earning a bachelor's degree within six years of matriculating. Graduation rates are calculated according to where students started as full-time, first-time students. Transfer students and students who return to college after an absence are not included.

¹⁰ Accenture and The Manufacturing Institute, [2014 Manufacturing Skills and Training Study](#), January 2015.

¹¹ For example, see R. Jason Faberman and Bhashkar Mazumder, "[Is There a Skills Mismatch in the Labor Market?](#)" Federal Reserve Bank of Chicago *Fed Letter* no. 300, July 2012.

¹² See Christopher Avery and Sarah Turner, "[Student Loans: Do College Students Borrow Too Much—Or Not Enough?](#)" *Journal of Economic Perspectives*, Winter 2012, vol. 26, no. 1, pp. 165-192.

¹³ See Julie Berry Cullen, Steven D. Levitt, Erin Robertson, and Sally Sadoff, "[What Can Be Done to Improve Struggling High Schools?](#)" *Journal of Economic Perspectives*, Spring 2013, vol. 27, no. 2, pp. 133-152.

¹⁴ For example, see Caroline M. Hoxby and Sarah Turner, "[Informing Students about Their College Options: A Proposal for Broadening the Expanding College Opportunities Project](#)," Hamilton Project Discussion Paper, June 2013; and Scott E. Carrell and Bruce Sacerdote, "[Late Interventions Matter Too: The Case of College Coaching New Hampshire](#)," NBER Working Paper no. 19031, May 2013.

¹⁵ James Heckman, "[Schools, Skills, and Synapses](#)," *Economic Inquiry*, July 2008, vol. 46, no. 3, pp. 289-324.