

THE FUTURE OF
WORK

AND WHAT IT MEANS FOR
HIGHER EDUCATION

A THREE-PART SERIES



PART ONE:

The changing workplace and the dual threats of automation and a gig economy.

PART TWO:

How higher education can better meet the demands of the 21st century workforce.

PART THREE:

The colleges and universities already filling the needs of the next economy.



THE WORLD OF WORK is undergoing a massive shift. Not since the dawn of the Industrial Revolution in the 17th and 18th centuries and the Information Age that followed in the last century have we seen the scale of disruption already taking place in the workforce.

Entire occupations and industries are expanding and contracting at an alarming pace, and the skills needed to keep up in almost any job are increasingly churning at a faster rate. Average human knowledge is doubling every 13 months, and IBM predicts that in the next couple of years with the expansion of the Internet of Things, information will double every 11 hours.¹

The changing nature of work is “the defining economic feature of our era,” according to former Treasury Secretary and Harvard University president Lawrence Summers.² While previous shifts in how we work have typically been accompanied by an expansion in the amount of education required to get a good job —the introduction of mandatory high school in the early 1900s, the expansion of higher education in the 1960s—it remains unclear whether simply adding more time to a person’s education early in life will be enough to compete

in the 21st century economy.

Rather, the purpose and structure of higher education will need to shift to keep pace with changes in the workforce. Instead of the industrial model of education, where students follow a prescribed curricula delivered largely in formal classroom settings, higher education in the future will need to equip students with collaborative, problem-solving skills to self-direct their own learning for life in way that allows them to complement rather than try to compete with technology.

“Tasks that cannot be substituted by computerization are generally complemented by it,” said David Autor, an economist at MIT, who studies the impact of automation on the job market.³ “This point is as fundamental as it is overlooked.” Competencies such as computational ability, technical literacy, and writing

ERA ONE
**19TH
CENTURY**

Machines take away the **dirty and dangerous:** industrial equipment, from looms to the cotton gin, relieves humans of onerous manual lab.

ERA TWO
**20TH
CENTURY**

Machines take away the **dull:** automated interfaces, from airline kiosks to call centers, relieve humans of routine service transactions and clerical chores.

ERA THREE
**21ST
CENTURY**

Machines take away **decisions:** intelligent systems, from airfare pricing to IBM’s Watson, make better choices than humans, reliably and fast.

Source: Harvard Business Review, June 2015



will remain important in the future, of course.

But what will separate the top talent from everyone else in the workplace of tomorrow will be a flexible and growth mindset that recognizes learning never ends. The ability to communicate, work in teams, solve problems on the fly, and adapt to change are more important than ever before now that hard skills are ever changing, and, in some cases, being replaced by automated machines and artificial intelligence.

The problem for higher education to solve, however, is that students often come to campuses focused on finding a major that will lead to a job. Indeed, freshmen now tell researchers in an annual nationwide survey of first-year students that the number one reason to attend college is to “get a better job” (“learn about things that interest me” had been the top reason for decades).⁴

The future workforce demands that higher education begin to rethink the historical purpose of the college degree—especially the appropriate mix between theory and practice and how credentials communicate what students know to the wider world. In the papers that will follow in this three-part series, we will look more closely at how colleges and universities need to rework their offerings and their structure to better prepare students for the workplace of tomorrow, and we’ll highlight institutions already undergoing such transformations.

THE TWO FORCES SHAPING THE FUTURE OF WORK

Perhaps the most important skill higher education can provide to individuals in the 21st century is one that will likely never show up in any job advertisement: the ability

to navigate ambiguity. Curiosity, resilience, entrepreneurship are necessary attributes in a dynamic job market where individuals will increasingly advance between occupations and industries many times throughout life. These are the attributes that will allow them to have greater control over their own destiny in an economy with so many unknowns.

The job market right now is wholly unfamiliar when viewed through an historical lens, and as a result, is causing great unease for generations of workers. While unemployment remains low, not everyone is participating in the economy as in the past, and even those who are continue to be worried about what’s next.

People are working longer into what would normally be considered their retirement years, with 20 percent of Americans 65 and older now employed in regular jobs (the most since before Medicare was enacted).⁵ Young college graduates are struggling to launch into the workforce, with nearly half underemployed in jobs that don’t require a bachelor’s degree.⁶ And men in their prime working years—25 to 54—are leaving the workforce in droves. In the 1950s, only about one in 20 men in that age group did not work; within a decade, it is predicted about one in seven won’t be working.⁷ At play in the economy are two simultaneous forces unsettling workers wondering if there will be enough jobs in the future to gainfully employ them.

First, automation and artificial intelligence threaten to displace not only blue-collar workers performing routine jobs, but white-collar employees in knowledge industries. Second, the emergence of the gig economy is reshaping the traditional employer-employee relationship as more contractors and freelancers fill roles once reserved for full-time workers making good salaries.

FORCE ONE: AUTOMATION

One often-cited study from Oxford University predicts that nearly half of American jobs are at risk of being taken over by computers within the next two decades, amounting to almost \$15 trillion in wages (see Figure 1)⁸.

While experts predict that few occupations will be totally automated, most jobs are likely to have many of their basic activities performed by a computer in the future. As a result, nearly all occupations will go through a change: one-third of the skillsets required to perform today's jobs will be wholly new by 2020 (see Figure 2).⁹ Some studies suggest that 65 percent of children currently entering elementary school will, when they are adults, have jobs that do not yet exist and for which their education will fail to prepare them.¹⁰

"Technology is continuing to accelerate," said Martin Ford, the author of *Rise of the Robots*, one of many contemporary books predicting upheaval in economies around the world because of rising computerization.¹¹ "Computers used to only be able to do routine tasks, but now they can match some human tasks."

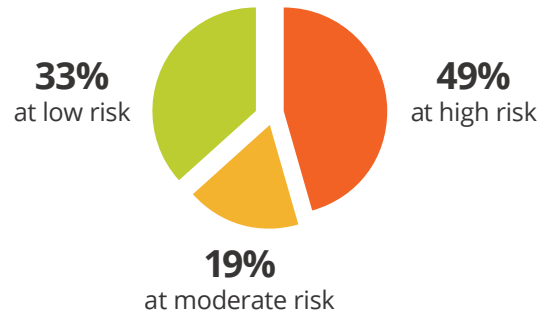
Take, for example, collecting reams of numerical data and writing a narrative to try to make sense of it all. Software called Quill is already being used to write up game stories for sports web sites or compile lengthy financial reports on mutual funds for T. Rowe Price and USAA.¹² Meanwhile, in Amazon warehouses, robots not only grab items to fulfill orders, but they navigate and coordinate their routes with the precision of an air-traffic controller to do it four-times faster than a human logistics manager did it previously.¹³ And, of course, the most famous robot in the world, IBM's Watson, can recommend medical treatments based on scanning volumes of research from around the world.¹⁴

Such scenes sound like they are right out of the *Jetsons*, the 1960s-era cartoon that imagined a family living in a utopian future. Much like the world the *Jetsons* inhabited, past predictions of mass unemployment due to the influence of technology have proven to be wildly exaggerated because workers moved to higher

FIGURE 1

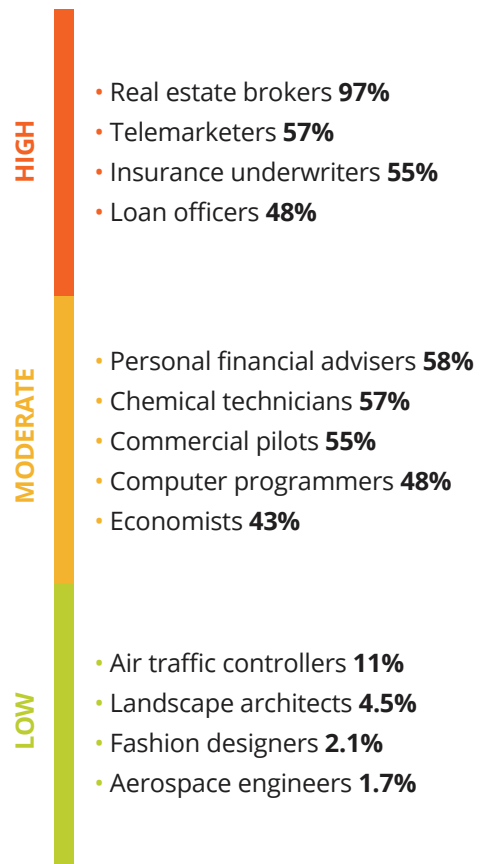
THE GROWING IMPACT OF AUTOMATION

Almost half of U.S. jobs are at risk of being taken over by computers within the next 20 years, according to a Oxford University study.



SELECT OCCUPATIONS

and their risk levels of automation:



intellectual ground to stay ahead of advancing robots. There is evidence that progression will occur again as long as workers have the mindset to figure out how they can add value to machines.

FORCE TWO: THE GIG ECONOMY

While the term “the gig economy” conjures up images of popular apps for temporary work, such as Uber and Task Rabbit, the shadow economy of freelancers is much larger than the just-in-time services we can request on our smartphones.

The very concept of the nine-to-five job and 40-hour work week is quickly being reshaped by technology-enabled independent work that can be done anywhere, at any time. In a 2016 study, two noted economists, Lawrence F. Katz and Alan B. Krueger, found that all employment growth in the United States since 2005 appears to have come from what they termed alternative work—that is “offline” contract and freelance work, which has ballooned by 50 percent over the last decade (see Figure 3).

The McKinsey Global Institute estimates that 20 to 30 percent of the working age population in the United States and the European Union is engaged in independent work. While some workers perform freelance work because they can't find full-time employment, seven out of ten independent workers choose to engage in the gig economy.¹⁵

Contract work is not new, of course. What is different these days is the type of work that is being outsourced. Decades ago companies outsourced blue-collar work, such as janitors and the cafeteria staff. Now they are doing the same with white-collar jobs, and in the process altering the basic idea of the employer-employee relationship.

The consulting firm Accenture PLC has predicted that within the next decade, one of the 2,000 largest companies in the world will have “no full-time employees outside of the C-suite,” a trend the firm has termed the “liquid workforce.” Already, Google's Alphabet Inc., has about the same number of full-time employees, some 70,000, as it does contractors who work on everything from marketing to data projects to reviewing legal documents.¹⁶

While robots taking jobs make for attention-grabbing headlines, the move toward a freelance economy might end up having more of a long-term impact on how higher education prepares students for the next economy. A workplace without employees requires students to think more like entrepreneurs as they piece together work into a portfolio of projects. Economists note that Hollywood, where studios approve a television show or movie for production and only then hire directors, actors, editors, and marketing agencies, has long worked like this. In the future, more workplaces

FIGURE 2

TOP 10 SKILLS IN 2020

1. Complex problem solving
2. Critical thinking
3. Creativity
4. People management
5. Coordinating with others
6. Emotional intelligence
7. Judgment and decision making
8. Service orientation
9. Negotiation
10. Cognitive flexibility



Source: Future of Jobs Reports, World Economic Forum

It remains unclear whether simply adding more time to a person's education early in life will be enough to compete in the 21st century economy.

might be like those Hollywood studios without any long-term obligations to workers.

One of those key roles that employers have always played is in the professional development of their workers. On a yearly basis, usually through annual performance reviews, employers would advise employees about the skills needed to keep their job or what was required to be promoted. In many cases, employers would suggest training programs and pay for them.

But freelancers get no such guidance nor help on finding or paying for continuing education. In a gig economy, workers need to self-direct their own learning—decide what knowledge they’re missing, where to acquire it, and how to fit learning into daily routines—a skill very few have absorbed in a lifetime of schooling where teachers, parents, professors, and even the course syllabus, laid out a learning pathway for them.

THE SKILLS NEEDED IN THE NEXT ECONOMY

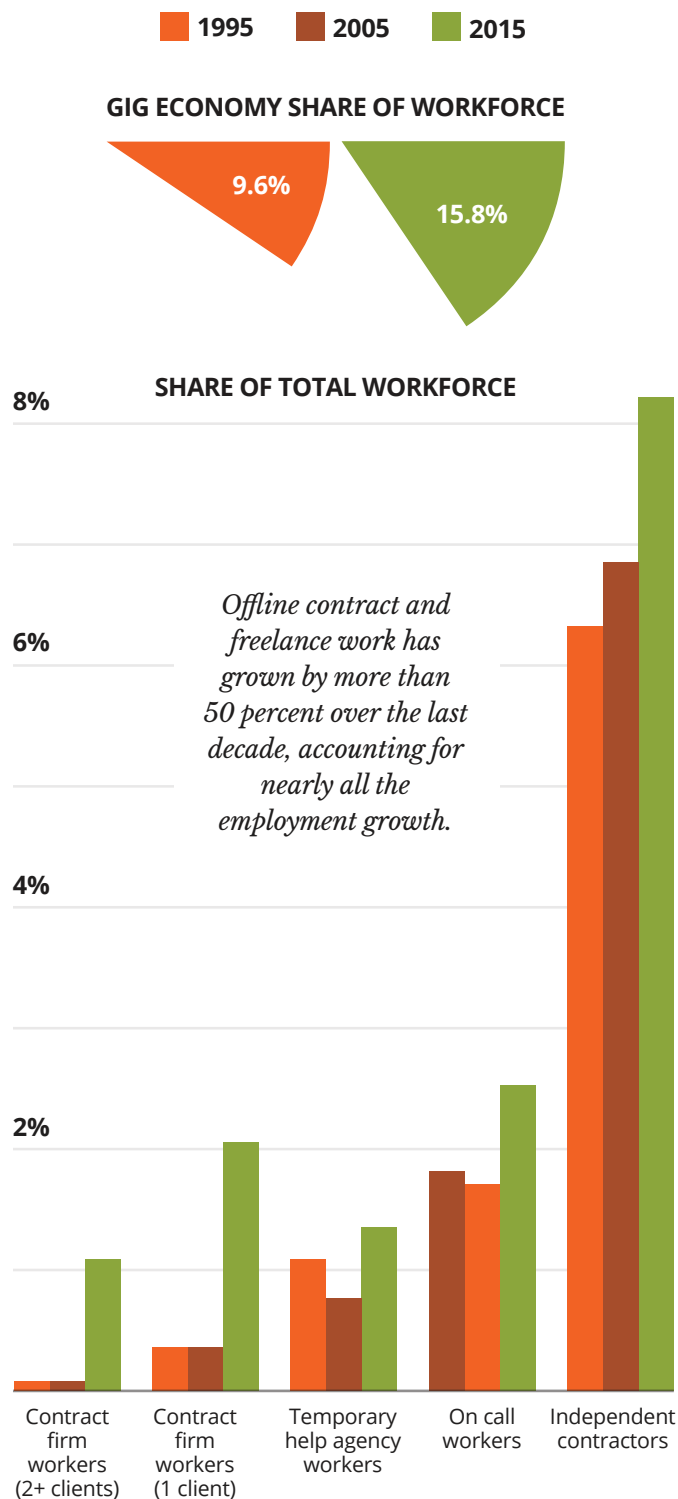
Every year, the Manpower Group, a human resources consultancy, conducts a worldwide “Talent Shortage Survey.” Last year, 40 percent of employers in the U.S. and abroad reported difficulty filling jobs due to lack of available talent.¹⁷ Critics have questioned whether a skills gap actually exists or whether companies just want the government and higher-education institutions to take on their training responsibilities.

A skills gap does exist, but not in technical skills; rather it’s in the soft skills, a term associated with how people get along with one another, communicate, and work in teams. These skills should be called the hard skills because they are difficult to teach. Employers once believed soft skills were embedded in a college degree. It’s one reason there has been credential creep in most occupations—positions that didn’t ask for a college degree twenty years ago now do. Employers use the degree as a sorting mechanism in the hiring process.

But now employers are less sure that the college degree is the strongest signal that applicants come armed with soft skills. It’s why employers now specifically ask for soft skills in job advertisements.

FIGURE 3

GROWTH OF THE GIG ECONOMY



Source: Lawrence Katz (Harvard University) and Alan Krueger (Princeton University)

A study by Burning Glass, a company that analyzes online job data, found that soft skills are often the “baseline skills” needed just to get in an employer’s door. Burning Glass analyzed the requirements listed in 20 million job postings across all industries in 2014 and compiled its list of the most requested baseline skills.¹⁸

The analysis found that the number of baseline skills was actually fairly limited: 25 skills appeared in three out of every four job advertisements, no matter the industry. Virtually every job posting included in its top five

requirements communication, writing, and organizational skills. Writing, for example, was an important skill even in information technology and health care jobs. Other competencies frequently requested across industries were a combination of soft skills—customer service, problem solving, planning, and being detail-oriented—as well as very specific hard skills—Microsoft Excel and Word (see Figure 4).

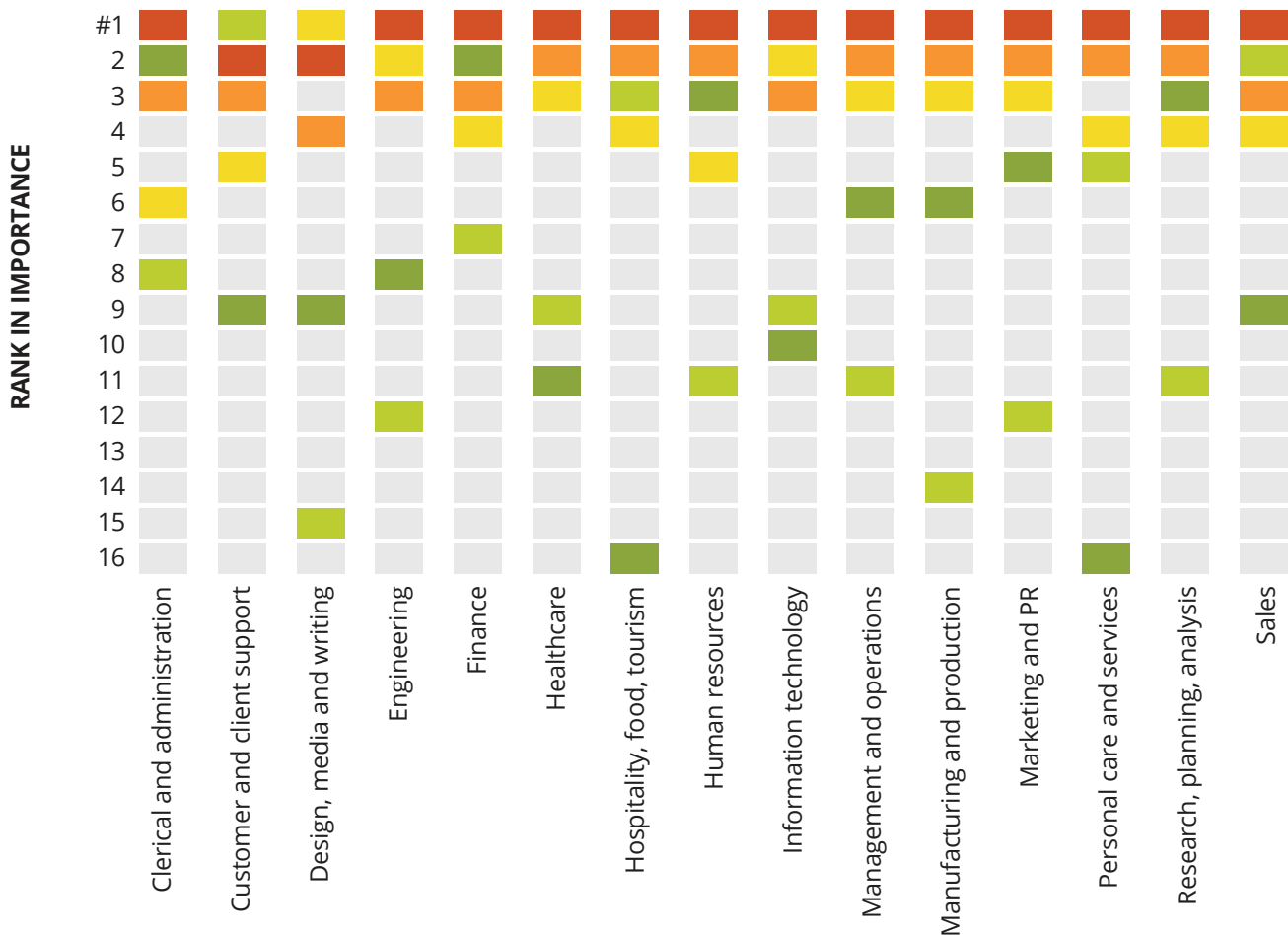
Another study, this one by David Deming, an associate professor of education and economics at Harvard

FIGURE 4

POPULAR SKILLS ACROSS INDUSTRIES

The top few skills that employers rank as most important are common across all industries. Communication, writing, and organizational skills are listed as requirements for almost every job posting.

- #1 ■ Communication skills
- 2 ■ Organizational skills
- 3 ■ Writing
- 4 ■ Customer service
- 5 ■ Microsoft Excel



Source: Burning Glass

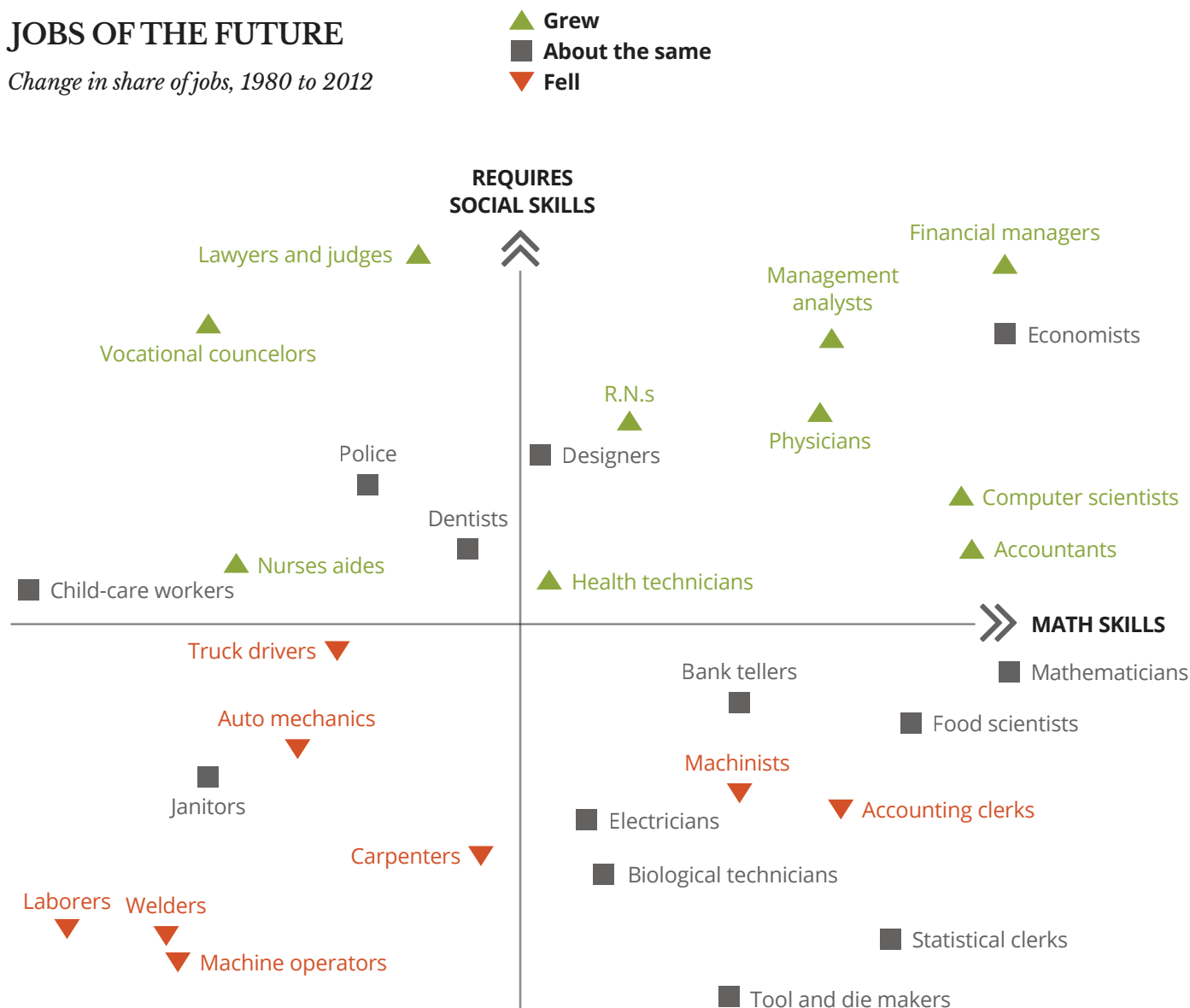
University, found jobs requiring both soft skills and thinking skills have seen the largest growth in employment and pay in recent years. Math-intensive jobs with high social-skill requirements, such as physicians and management consultants, have grown by nearly 10 percentage points as a share of the U.S. labor force in the last four decades; by comparison, math-intensive but less social jobs, such as mathematicians and economists, have shrunk over the same time period.¹⁹ The jobs with the biggest losses were those that require neither social nor math skills, such as manual labor (see Figure 5).

The bottom line: social or soft skills are just as important as technical skills when it comes to success in the job market. While students are often encouraged to major in job-ready fields like STEM (science, technology, engineering, and math), graduates of those programs are unlikely to find employment without solid grounding in the liberal arts and experiences outside the classroom to build their soft skills. Such experiences give workers both the breadth and depth needed in a dynamic, ever-changing job market.

FIGURE 5

JOBS OF THE FUTURE

Change in share of jobs, 1980 to 2012



Source: David Deming, Harvard University

THE RISE OF THE T-SHAPED EMPLOYEE

As director of the Collegiate Employment Research Institute at Michigan State University, Phil Gardner has watched how the job market for new college graduates has shifted over the past three decades. In the past big employers, like General Motors, Procter & Gamble, and IBM, dominated the campus recruiting circuit by hiring hundreds of grads a year in a few specific majors. More recently, not only have an expanded set of employers been hiring fewer new graduates, but they are also hedging their bets in terms of majors, looking for math and science graduates but also liberal arts graduates.

The next wave in hiring, Gardner believes, has already arrived. Companies and organizations are looking for a set of diverse competencies that no one academic major provides, and yet he said, “we get way too hung up on a major and a degree leading to a job.”

FIGURE 6

THE MULTI-SKILLED ‘T’ WORKER

A “T” worker has an attractive diversity of capabilities: a deep understanding of one discipline and one industry, along with the ability to work across many complex subject areas.



The breadth and depth needed for today’s workers is illustrated in what is often referred to as the T-shaped individual (see Figure 6). The idea of the T-shaped individual first emerged in the early 1990s, as a metaphor for a kind of Renaissance man. The vertical bar of the T represents a person’s deep understanding of one subject matter—history, for example—as well as one industry, perhaps energy or health care. The horizontal stroke of T-shaped people is the ability to work across a variety of complex subject areas with ease and confidence. As the world becomes more complicated technologically, the need for this ability is far greater today than it was two decades ago.

The trends of the 21st century have shaped our world into an endlessly connected and informed place. Globalization, information technology, scientific breakthroughs, cooperative action across cultures propel people at ever increasing rates into new realms of knowledge and continuous communications. This accelerated and open process of information exchange is constantly evolving, meaning that no one sphere of knowledge, no one discipline will sustain students and researchers for their entire careers.

To learn and cultivate the skills of the future workforce, students need to possess mindsets that will help them achieve success. Three mindsets, in particular, are pertinent to the needs of future learners:

- Grit and the belief that we don’t have a fixed intelligence but a growth mindset for continuous self-improvement;
- A belonging mindset that encourages students to value and seek those with different backgrounds, skills, and perspectives;
- An entrepreneurial mindset that allows students to figure out what can be done rather than focus on a fixed goal.

How colleges and universities adapt legacy teaching models to encourage these mindsets in students and help them meet the demands of the 21st century economy is perhaps the greatest challenge facing higher education today. **In part two of this series, we will outline some of the steps colleges can take to better serve the learning needs of students in the future.**

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