

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 FEAR OF TECHNOLOGY REPLACING HUMAN JOBS is almost as old as technology itself.

When William Lee invented a mechanical knitting machine in the late 1500s, Queen Elizabeth I refused to grant him a patent for the stocking frame fearing the impact of the device on the hand-knitting industry. Over two centuries later, a young apprentice named Ned Ludd destroyed more sophisticated versions of the stocking frame, and his name eventually became synonymous with a movement—the Luddites, who feared that their jobs would be supplanted by new machines. The story of the stocking frame and the narrative of technology replacing people repeated itself in the 1800s and 1900s on farms, in factories, and in office cubicles.¹

For centuries, the answer to advancing technology was education. The belief was that additional schooling would keep workers one step ahead of automation in almost any job. And in the race between education and technology, education has always won.

But educators have long had an uneasy relationship with their role in preparing the workforce. Colleges and universities, in particular, do not want to be seen only as a cog in the wheel of the industrial economy, so efforts to better align their academic offerings to the needs of the job market have always been fraught with tension.

Debates over the purpose of college—is it for a job or for a broad education—date back to the decades before the Civil War, when the impact of the Industrial Revolution and the westward expansion of the United States was increasing the need for skilled labor in the workforce. A group of higher-education leaders, including the president of Brown University and the founder of Rensselaer Polytechnic Institute, worried universities would become irrelevant in the new economy and led a campaign to add vocational majors like civil engineering to what at the time was a classic curriculum of languages, rhetoric, and literature. Their efforts were largely rebuffed, although their dream was later realized when in the midst of the Civil War, President Lincoln signed the Morrill Act, giving land to the states to build agricultural colleges. This national network of land-grant universities from Iowa State to Michigan State quickly added programs in mechanics, engineering, and manufacturing.²

The founding of the land-grant universities led to a dramatic rise in the number of vocational majors on campuses everywhere. In response, there was a crusade among higher-education leaders to create a common general education curriculum to ensure graduates would also lead a life of the mind. By the 1960s, the pendulum

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swung back in the other direction, and students were given more choices in course offerings within broad categories.³

Now the movement within higher education is similar to that of the years before the Civil War—following the demands of the workforce and linking the curriculum to the hottest jobs. Hardly a week passes where colleges aren't announcing new majors in fields such as social media marketing, computer coding, and data analytics.

But such a narrowing of the academic focus of students is a mistake, argues Anne-Marie Slaughter, co-chair of the Shift Commission on the future of work, workers, and technology. “Vocational majors tend to teach skills that can easily be automated,” she says. College graduates need to have a broad perspective to constantly maneuver through an uncertain economy in the future. “The question is how humans are going to add value to work,” Slaughter says.

THE SHIFTING JOB MARKET AND THE CHANGING MARKET FOR SKILLS

Although the shifts in the job market right now are often compared to those of previous eras in the world of work, two key differences are likely to impact the role higher education plays in preparing graduates for the future.

First, is the churn in the workforce. Jobs are changing at warp speed. Some of today's most popular jobs didn't even exist ten years ago, according to an analysis by LinkedIn (see Figure 1). What's more, a few of the jobs that appear on the fastest-growing list produced by the U.S. Bureau of Labor Statistics (see Figure 2), such as retail salespeople, also appear on lists of jobs most

FIGURE 1

JOBS THAT DIDN'T REALLY EXIST A DECADE AGO

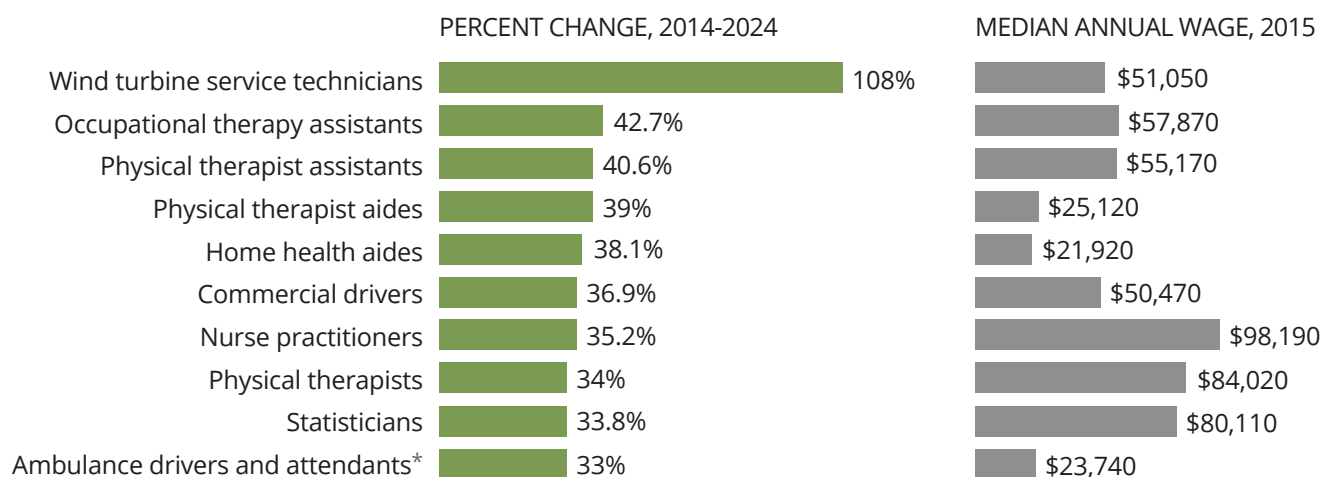
LinkedIn examined the data of more than 250 million members to determine the most popular job titles that were nowhere to be found in 2008.



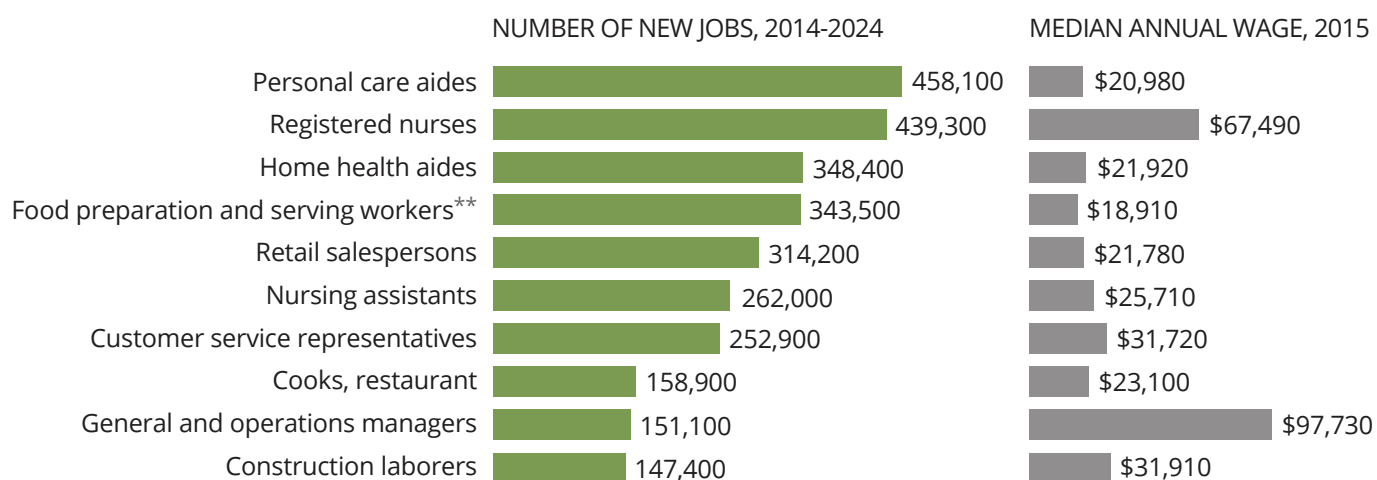
FIGURE 2

OCCUPATIONS WITH HIGH PROJECTED GROWTH

FAST GROWING



LARGEST JOB GROWTH



Source: U.S. Bureau of Labor Statistics

* excludes Emergency Medical Technicians ** includes fast food

threatened by automation. In other words, the job market is moving so quickly that what will happen with it between now and the middle of the next decade is a bit of a guessing game.

Second, skill sets within occupations are also changing. So even if broad categories of jobs don't shift much in the coming years, it's likely required skills will. Purely

technical occupations are expected to show a new demand for creative and interpersonal skills, according to surveys by the World Economic Forum.⁴ Take healthcare practitioners, for example. Technology will allow increased automation of diagnosis and personalization of treatments, redefining many medical jobs into translating and communicating data effectively to patients.

“The need to retool yourself at various points in your career is going to be paramount in the years ahead,” says Neil Jensen, vice president for corporate strategy at Workday. “The future of work is one where learning will always be on.”

Overall, a wide range of occupations will require a higher degree of cognitive abilities—creativity, logical reasoning, and problem sensitivity—as part of their core skill set. More than half of all jobs expected to require cognitive abilities as part of their core skill set in 2020 do not yet do so or do to only a small extent (see Figure 3).

Matthew Sigelman, CEO of Burning Glass, a Boston-based data analytics firm that studies labor trends in real time, calls this trend the “dynamism of the job market.” His company’s research has found that so-called hybrid jobs—positions that require a set of skills that aren’t typically taught as a package in college—are rapidly on the rise. For example, positions in mobile development, which combines skills from engineering, coding, and computer science, have grown by 135 percent since 2011. Data science jobs have quadrupled in the last five years, while the number of

positions specifically requesting data visualization skills have grown six times as fast.

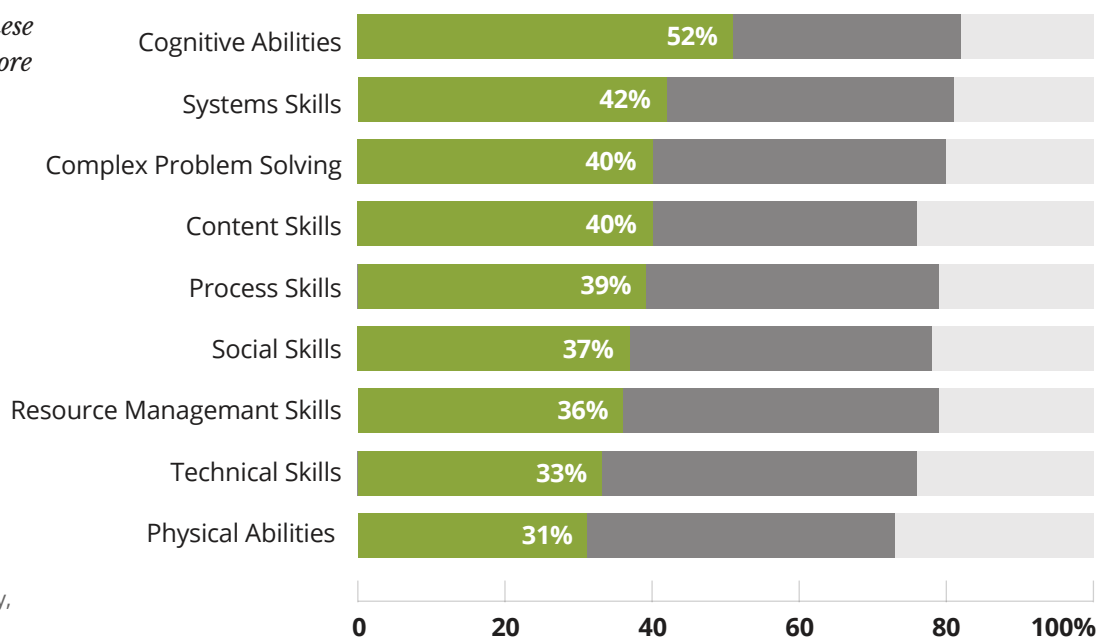
It’s not just technical skills. Graduates with traditional liberal-arts degrees can nearly double the number of jobs available to them if they have one of eight technical skills, such as social media proficiency, graphic design, data analysis, which can be often gained through a single course or an internship. “Employers really value soft skills that are the bedrock of a liberal-arts education,” Sigelman says. “It’s not a matter of shutting down the classics department and turning it into a business degree.”⁵

What skills college graduates need to possess on commencement day is critical for college leaders imagining what their institutions will look like in the next decade. Much as the first part of this three-part series laid out the dual threats to the world of work (automation and the gig economy), in this second part of the series we will look at the approaches to education that campuses need to consider to prepare for what’s next in the job market.

FIGURE 3

CHANGING DEMAND FOR CORE SKILLS IN JOBS OF THE FUTURE

Share of jobs requiring these skill sets as part of their core requirements in 2020.

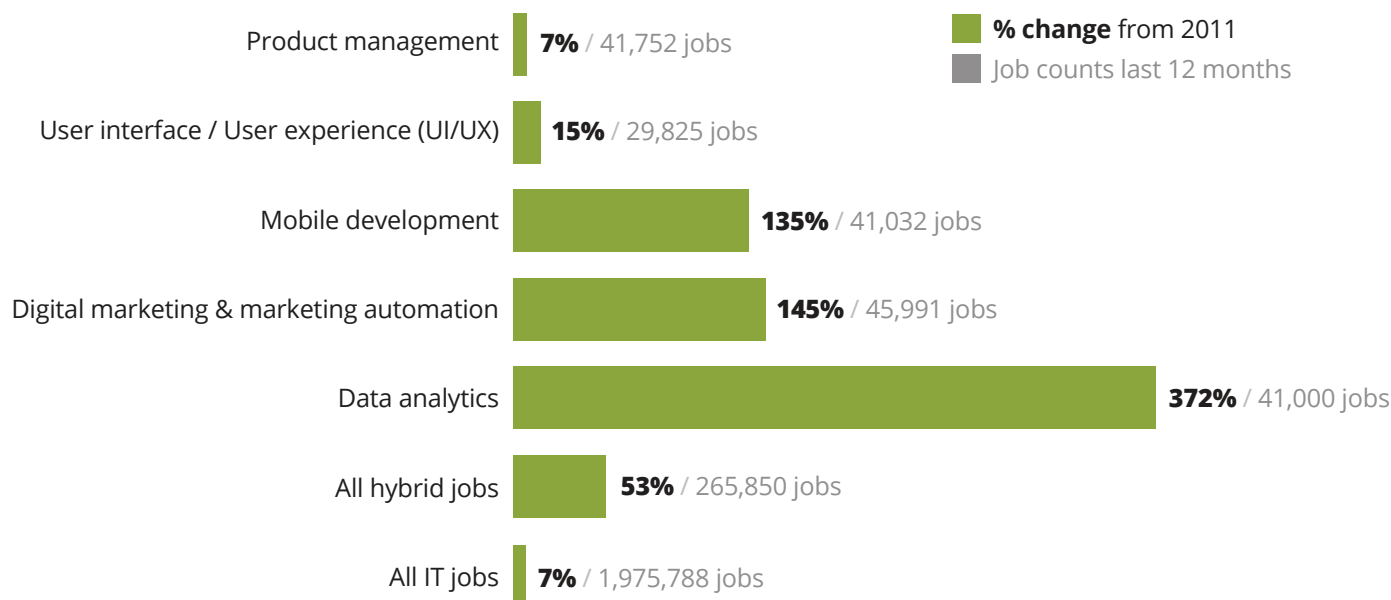


Source: Future of Jobs Survey, World Economic Forum

FIGURE 4

FASTEST GROWING HYBRID JOBS

Research from Burning Glass Technologies has found that so-called hybrid jobs—positions that require a set of skills that aren't typically taught as a package in college—are rapidly on the rise.



Sources: Burning Glass Technologies and General Assembly

THE AGILE, ADAPTIVE, AND IMAGINATIVE COLLEGE

Higher education is heading into unknown territory. Unlike the changes in the workforce that ushered in the curricular shifts in the decades surrounding the Civil War, this time colleges will need to move much faster than in ten-year increments. Also, tinkering around the edges of majors and individual courses that defined the curricular reforms of the 20th century won't suffice now.

As knowledge grows exponentially because of the Internet, complex systems are emerging in the workplace at the intersection of hardware, software, and human beings. We're already beginning to witness this in our daily lives. Think about the nexus between us and devices that control the Internet of Things, whether it's the Fitbit on our wrist, the Nest that controls the temperature in our home, or the Amazon Alexa personal

assistant on our kitchen table.

To manage these complex networks, higher education needs to prepare students who can navigate across disciplines and also have deep knowledge of individual subjects. Pete McCabe, vice president of global services at GE Transportation, says his industry needs more "quarterbacks," people who can oversee a team of specialists to solve a common problem. "Knowing where to push," he says, is essential.⁶

If higher education is to remain relevant, colleges and universities need to become more agile, adaptive, and imaginative. Interviews with more than three dozen corporate leaders, education policymakers, and college officials, including deans, provosts, and faculty members, revealed five approaches that the education system can take to better position itself and students for the new world of work:



Restructure the largely single pathway to college, beginning with more career exploration and college-level work in high school. The complexities of the workforce can no longer be adequately taught during a four-year college curriculum. Career tracks are no longer straight and linear; they are interconnected and overlapping, and the preparation needed to succeed in the modern economy needs to be interconnected.

Dual enrollment courses—in which high-school students can earn school and college credit simultaneously—is one way the two education systems can be aligned. Such programs allow students to get a head start on college to potentially explore majors and open up more time later on for internships and experiential learning opportunities. At the same time, college professors can shape how students are being prepared for the rigors of higher education.

Relevant work experiences can also be added to the high-school curriculum to allow students to test out potential career options, or at least get a sense of the complexity of the workplace today. Most high school graduates pick careers that are familiar to them. But given the changes in the workforce and the growing segregation of many career fields to certain regions of the country, it's difficult for students to have a sense of how their skills and interests line up with occupations and careers.

Colorado, for example, is working to make apprenticeships ubiquitous in high schools around the state, offering hands-on training in financial services, information technology, and health care as well as manufacturing. The goal is to make the program available to some 20,000 students within the next decade.⁷



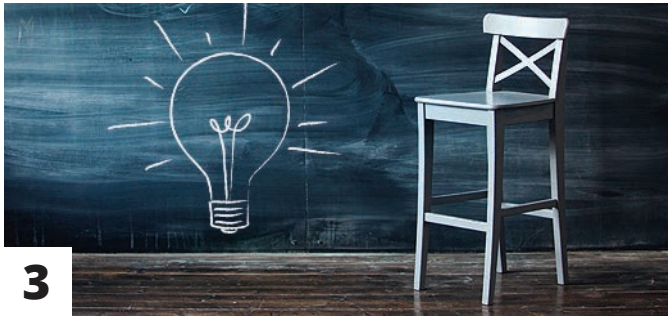
Transform general education at the beginning of college with a strong element of self-directed learning. The common core of undergraduate education has given way at most colleges to a hodgepodge of courses that students take to fulfill distribution requirements or to a confusing set of integrated learning experiences that are sometimes more fluff than substance. Vastly different requirements within majors mean that students dedicate little time to courses outside of their disciplines, and usually it's the liberal-arts students who get the most flexibility.

But it's clear that the hybrid jobs of the future will require students in both liberal-arts fields and STEM fields (science, technology, engineering, and math) to get a healthy mix of broad education and specific skills. That will only come if colleges carve out time for a common curriculum, perhaps one covering the entire first year of the undergraduate experience, followed then by separate major-specific programs of varying lengths depending on the needs of the disciplines.

No matter what, a healthy dose of self-directed learning needs to be included in the very early days of college, or maybe even in high school. Students today are directed from a very young age in their educational journey by parents, teachers, counselors, and professors. As a result, once in a job or career, they are unaccustomed to the uncertainty of the workplace, which is a mash-up of activities with no scheduled end. "Being able to get stuff done is a capacity that is rather important," says Tim Brown, CEO of IDEO, a well-regarded Silicon Valley design firm, which receives about 20,000 job applications a year for 150 positions.

A required core curriculum might sound like a

contradiction to the concept of self-directed learning, but within that common experience students could track their own progress and recognize gaps in their skills that require more education. That self-assessment skill will prove useful in a future where learning is lifelong and often workers will be required to find necessary training themselves. “The ability to learn how to learn will be one of the most sought after skills in the future,” says Jensen of Workday.



3

Restructure majors, so they are not solely controlled by academic departments cut off from each other. Cross-disciplinary majors were the buzzword of the last two decades in higher education, but if you go to most colleges or universities you will still find a similar taxonomy for their schools and majors with a sprinkling of majors that cross disciplines.

“You have to be willing to be disruptive and to be not replicative,” says Michael M. Crow, president of Arizona State University, which has created entirely new schools with names such as the College of Public Service and Community Solutions as well as the Institute for the Future of Innovation in Society. “Why do all public colleges and universities build the same structure? Why do they all have the same political science department, the same history department, the same chemistry department? Why aren’t the departments at different institutions wildly different? We should be offering students various pathways for learning while retaining the grounding knowledge.”⁸

The barriers between departments must be replaced with majors that are designed around a complex web of disciplines and structured to solve the knottiest problems facing the world, such as the food and water supply, energy, climate change, space exploration, law, media

literacy, and even the future of work itself.

Consider the sustainability major at most colleges—it’s focused largely on environmental science. But sustainability is about much more than just the environment around us. It should bring together engineering, physics, economics, data analysis, as well as representatives from the professional schools like health sciences, architecture, and law. By exploring multiple perspectives and approaches, students will learn at a young age how to navigate the networks of the modern workforce and become the “quarterbacks” that the economy increasingly needs.



4

Require a co-op experience, so that work is integrated into the undergraduate curriculum. Hands-on learning opportunities in college allow students to apply their knowledge in real time and see how their classroom work plays out in the real world. While co-ops provide the best work experience because they are integrated into the curriculum and not seen as an activity on the side, experiential learning of any kind—internships, study abroad, and research projects—also provide a similar opportunity to actually use theories from the classroom.

Experiential learning in college has been found to have a long-lasting impact in a graduate’s career. The Gallup-Purdue Index surveyed some 30,000 bachelor’s degree recipients to measure their well being in life and career.⁹ Graduates with outside-the-classroom experiences were twice as likely to be engaged in life and work after graduation—meaning they were curious, interested, and had a passion for what they were doing.

The future workforce demands that higher education not be a bifurcated experience for students, where learning is followed by working. Co-ops can provide a healthy

dose of reality in a short amount of time and allow students to allocate their time more efficiently, learn about workplace norms and responsibilities, and find mentors and learn about networks that will be key to them in finding a successful career.



Integrate on-campus activities into the undergraduate curriculum. Relevant learning experiences that students have outside the classroom during their undergraduate years—in clubs, on athletic teams, in residence halls—often don't contribute to the credits needed for the degree. They are not measured or often valued, so students see them disconnected from the curriculum.

Yet such experiences contribute to the success of employees on the job. Firms that track why workers survive and thrive in their careers report that often it's not their college, major, or grades that are the differentiating factor, but rather the activities they dedicated substantial amounts of time to in college that really make the difference on the job. This level of dedication and time on task is often referred to as the 10,000 hours theory—that it takes roughly that amount of practice to achieve mastery in any field.

By better integrating some of this outside-the-classroom work into the formal curriculum and counting it toward the degree, students could use their learning in more than just the context of a course.

Colleges and universities have lasted centuries because they have adapted to the changing needs of society and the workforce. The technological and global forces bearing down on both education and the world of work

require us to react to ever more complex problems that can only be solved with systems thinking and a network approach. Colleges need to do more than innovate around the edges of their curriculum; the future of work requires more substantive changes. **In part three of this series, we will profile some colleges already taking steps to better serve the learning needs of students.**

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