ROBOT-READY

Human+ Skills
For The Future of Work

Strada Institute
FOR THE FUTURE OF WORK + Emsi

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Executive Summary

The nature of work is changing rapidly. Technological changes—in particular advancements in machine learning and deep learning—have sparked alarmist predictions of massive job obsolescence. Even conservative estimates indicate that significant proportions of the work humans do today will be automated in the coming decade. At the same time, technological advancements will continue to give rise to entirely new types of jobs. Futurists estimate that up to 85 percent of the jobs that will exist in 2030 haven't been invented yet.[1]

These sorts of projections tend to paralyze audiences, but it is worth noting that machines and humans already collaborate and will continue to coordinate even more closely in the future. From chatbots that lead into customer service calls to predictive analytics for students married to human coaching and advising, the world is already evolving into a robo-human future.

Meanwhile, policymakers, educators, and employers are vigorously debating how best to prepare Americans for the future of work. There are those who believe that the "hard" skills of science, technology, engineering, and math (STEM) are most critical to the future, and those who believe the uniquely "human" skills of the liberal arts[2] are the ones that will endure in the face of automation. We say, "both, and": It is the integration of human and technical skills that will provide the best preparation for the future of work.

Indeed, most of the current literature on the future of work underscores this growing need for human skills such as flexibility, mental agility, ethics, resilience, systems thinking, communication, and critical thinking. Northeastern University President Joseph Aoun has devoted an entire book to the concept of "humanics": "a new model of learning that enables learners to understand the highly technological world around them and that simultaneously allows them to transcend it by nurturing the mental and intellectual qualities that are unique to humans—namely their capacity for creativity and mental flexibility."[3]

The skills needed now and for the future combine the technical with the human: programming + ethics, artificial intelligence (AI) + emotional intelligence, or logic + values or judgment. While employers are scrambling for this new talent, postsecondary education is falling behind. In spite of all the trends and forces reshaping the world of work, few colleges or universities are redesigning their educational models to keep pace with the future. As Stephanie Kasriel, co-chair of the World Economic Forum's (WEF) Global Future Council on Education, Gender and Work laments: "And while some leading universities now offer courses on the gig economy or new technologies like the blockchain, it's far from being the norm. The vast majority of high schools and colleges aren't adapting quickly enough to the change, leaving their students increasingly unprepared for the job market."[4] Educators are out of step with the changing needs of the economy, which are being driven by advanced technology, such as AI, robotics, and data analytics.

But the future of work is now, and standing still is not an option. In order to shape the work of the future, organizations have a tremendous opportunity to redesign and cultivate this mindset of "both, and" earlier on in the learning process. It makes little sense to continue to pit a college education against workforce training, as if they are somehow mutually exclusive. The debates that separate a broad-based college experience from the professionalization of workforce training are tired. The American Academy of Arts and Sciences put it best in its report on the future of undergraduate education: "Today, the long-standing debate over the value of a liberal arts education versus a more applied postsecondary program presents a false choice." The most valuable workers now and in the future will be those who can combine technical knowledge with human skills.

So where exactly will this learning occur? Over the last few decades, students have moved in large numbers to career-oriented majors, such as business, health, and engineering—clearly hearing that the surest path to a meaningful, financially stable career is also the most straightforward one. Those pursuing liberal arts degrees, on the other hand, are on the decline. Policymakers have been particularly down on the outcomes of liberal arts, questioning the value of these majors as relevant to the challenges ahead.

In general, it has been difficult to understand the outcomes of liberal arts graduates. The liberal arts seem to be particularly subject to bold claims about their relevance and value—often with little data underpinning them. Alexander McCormick, director of the National Survey of Student Engagement (NSSE), the longest-running survey of undergraduates that examines the educational experience, explains: "When you look at college mission statements, they're loaded with grand pronouncements about the skills and habits of mind they're going to inspire in their students," yet "even as they teach their students to back up their claims with evidence, they don't have much evidence to back up those claims."[5]

It's not that institutions of higher education have not been trying to document learning outcomes. Many have. There have been major efforts, such as Association of American Colleges & Universities' Liberal Education and America's Promise (LEAP)[6] and Valid Assessment of Learning in Undergraduate Education (VALUE),[7] as well as Lumina's Degree Qualifications Profile (DQP).[8] The challenge has been, however, in translating these learning outcomes for a much wider audience beyond academia. As a result, depending on who you ask, these graduates are either headed for a lifetime as a barista or are capable of doing absolutely anything. Most audiences probably don't know, for instance, that in recent years, the growth of liberal arts graduates entering the tech workforce has actually outstripped growth in computer science and engineering graduates doing so.[9] The data in this report, however, is not intended to defend liberal arts programs.

Instead, we wish to use the liberal arts to bring clarity to the popular concept of a skills gap. We argue that the time has come for a modern-day Rosetta Stone to translate and decode the intersection between postsecondary education and the workforce. The translation of skills into the marketplace must be made clearer in order to connect three critical audiences: people looking for good work, employers looking for good people, and educators looking to build good programs and engage students.

We can begin this work by illuminating the lesser-known connections between liberal arts graduates and the companies that hire them. These pathways provide an excellent case example of the transformative possibilities ahead to prepare all learners better to combine their human skills and technical skills.

At the same time, these programs will have to embrace the "both, and," articulating better and embedding in majors the skills that liberal arts graduates will need to thrive in the future. Liberal arts graduates are too often left to stumble upon the valuable mixture of layered skills. It's one of the reasons why, today, a liberal arts degree is under attack and fewer learners are pursuing liberal arts degrees. They lack visibility and clarity about the journey and the outcomes. This report provides an initial mapping of the landscape upon which stakeholders across **all** disciplines can build.

Taken together, our findings reveal opportunities for learners, learning providers, employers, entrepreneurs, and policymakers to unpack human skills across careers and industries and radically transform our education-to-employment pathways.

The findings illustrate areas for improvement when it comes to cultivating learners' abilities to integrate human and technical skills. Liberal arts programs, in particular, cannot ignore signals in the labor market. These provide the key to clarifying exactly how human skills transfer and develop into granular skills that are in demand.

Key Findings

+ **Human skills, like leadership, communication, and problem solving, are among the most in-demand skills in the labor market.**

+ **Human skills are applied differently across career fields and must be effectively translated in terms of their relevance and application within a given field.**

+ **Liberal arts majors can break down barriers to entry through better identification and understanding of their human skills and the addition of targeted technical skills.** There is a discernible labor market demand for agile and resilient thinkers who have a handle on digital literacies— basic technical skills like data analysis and digital fluency.

+ **Liberal arts graduates' marketplace outcomes are positive but less predictable than those of their STEM peers.**

Robot-Ready: Human+ Skills for the Future of Work

Our Robot Future

Futurists and experts on aging and longevity are now suggesting that the first people to live to be 150 years old have already been born. David Sinclair, an Australian geneticist and a professor at Harvard Medical School, is researching ways to stop the aging process and believes that "it will be possible one day to be immortal."[10] This is nearly unfathomable, especially given the rising mortality rates of middle-aged white Americans.[11] But even if medical advancements could lead to 150-year life spans, does this mean that the careers of the future might possibly last 80 or 100 years?

The idea that a person might work for a single company over a period of decades is already a quaint notion. How many different jobs—or even entirely different careers—will a person have over a 100-year work life? This question feels particularly troubling when considering the velocity of technological change and how it is dramatically reshaping the jobs people do and how they do them.

Advancements in machine learning and deep learning have sparked alarmist predictions of massive job obsolescence, ranging anywhere from 8 percent[12] to 47 percent of the jobs in the U.S. workforce.[13] McKinsey estimates that about half of the work currently associated with $15 trillion in wages globally will become automated.[14] Workers are going to have to prepare not only for a much longer work life, but for a more turbulent one, too.

In a new learn-earn-learn cycle, workers will need to return to learning throughout their work lives. They'll need to be flexible and agile, able to shift and grow over the course of their longer work lives. It's also increasingly clear that the skills that cannot be easily automated—such as systems thinking, creativity, critical thinking, emotional intelligence, and communication—will be the ones needed to succeed in the future. The World Economic Forum anticipates that "[m]any formerly purely technical occupations are expected to show a new demand for creative and interpersonal skills."[15]

In a strange way, some of the high-skills work in demand today, such as computer programming, may become some of the most easily automated skills in the future. Economist David Autor explains that work like mathematics, logical deduction, and encoding quantitative relationships—really any work that involves "a set of formal logical tools"—can be automated. The work that is much more difficult to automate involves "flexibility, judgment, and common sense—skills that we understand only tacitly."[16] McKinsey Global Institute reaffirms this:

What Are Human+ Skills?

Automation will create an opportunity for those in work to make use of the innate human skills that machines have the hardest time replicating: social and emotional capabilities, providing expertise, coaching and developing others, and creativity. For now, the world of work still expects men and women to undertake rote tasks that do not stretch these innate capabilities as far as they could. As machines take on ever more of the predictable activities of the workday, these skills will be at a premium. Automation could make us all more human.[17]

More human. The skills that will give us security in this robot future are the very capabilities that define us as human beings.

Human skills and abilities go by many names: soft, non-cognitive, power, common, transferable, baseline, 21st century, employability, workforce readiness, interpersonal, talent, life, and professional.

These are skills that enable learners to transfer their knowledge from domain to domain in the face of job obsolescence and to learn new skills in demand. Human skills are in high demand across many industries and include skills such as leadership, collaboration, creativity, critical thinking, communication, emotional intelligence, judgment, ethics, and cognitive flexibility. In this report, we use **human** skills to contrast the skills that might possibly become automated by machines.

Human+

Human skills will be critical to coordinating more closely with machines in a complementary way. But human skills alone will not be enough. A "both, and" mentality embraces the duality of technical skills with uniquely human skills. The human+ skills needed now and for the future combine things like programming + communication, artificial intelligence (AI) + emotional intelligence, or logic + ethics.

So where exactly will this learning occur? Over the last few decades, students have moved in large numbers to career-oriented majors, such as business, health, and engineering—clearly hearing that the surest path to a meaningful, financially stable career is also the most straightforward one. The liberal arts, on the other hand, are on the decline.

What do we mean by "Liberal Arts"?

It's challenging to gain consensus on a definition of the liberal arts. The term broadly refers to the Western concept of education. America's modern view of a liberal education is one that is individualistic, global, and pluralistic in nature, typically emphasizing the classics or humanities. The term is also often used to refer to liberal arts colleges, which adopt a common curriculum aligned with the liberal tradition. In this report, however, we focus specifically on liberal arts majors in order to connect programs—not institutions—to learners as the fundamental unit transferring economic value in the labor market. As economist Anthony Carnevale explained in a recent Washington Post op-ed:

"What you earn depends much more on what you take in college than where you go. From a career perspective, college is more a market in program majors than a market in institutions."[18]

In our examination, we distinguish liberal arts majors from majors that are more career-oriented, such as business and healthcare, as well as the physical sciences, as they are more often grouped with STEM majors in common parlance.[19] We do include broad, interdisciplinary degrees, the humanities (English, philosophy, history, theology, etc.), and the social sciences. Through this analysis, we aim to clarify the outcomes of specific majors in order to understand how programs can both better translate competencies as marketable skills as well as prepare learners for the human+ skills they will need in order to thrive in the workforce.

In 1970, 36 percent of college graduates earned a degree in a liberal arts field. Today, only 23 percent do (Figure 1). Even more striking, much of this decline has occurred in just the past decade. History majors, for example, peaked in 2007 and have since dropped 45 percent.[20]

Figure 1.
Since 1970, BAs in liberal arts programs have declined from 36 percent to 23 percent.

1970
36% | **64%**

2016
23% | **77%**

■ Liberal Arts, Humanities, and Social Science Majors
■ Career-oriented Majors
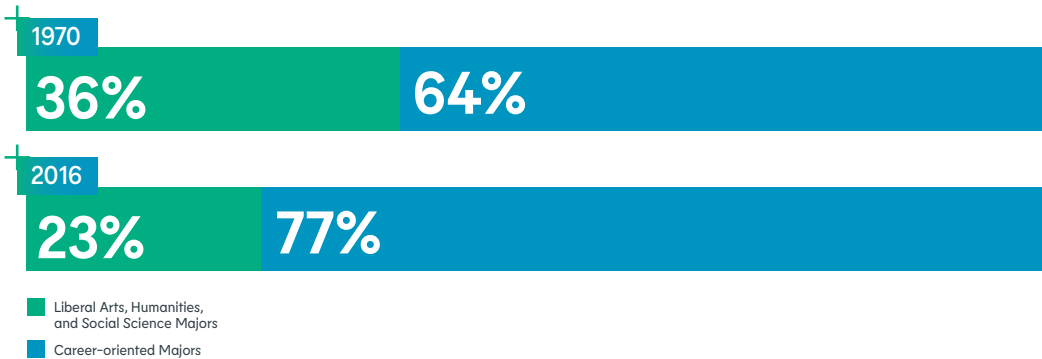
Source: Strada Institute for the Future of Work analysis of data from the Integrated Postsecondary Education Data System, 1970–2016.

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It is precisely because these programs are declining and also under attack that they prove exemplary in shining a light on the transformative possibilities ahead to prepare learners better to cultivate this "both, and" mindset. Graduates are too often stumbling upon the valuable layering of skills—the gaps that need to be filled—with little guidance from institutions. Most learners lack visibility into the human+ skills that need to be acquired in order to thrive and compete in the workforce. They need better optics into the lesser-known connections between liberal arts graduates and the companies that hire them.

In general, it has been difficult to understand the outcomes of liberal arts graduates. The liberal arts seem to be particularly subject to bold claims about their relevance and value—often with little data underpinning them. We will illuminate their pathways with data, but this analysis is not intended to defend liberal arts programs. The data in this report reveals the human+ skills liberal arts graduates are displaying in their resume and social profile data as they migrate between

industries and occupations, which are then being validated by the employers that hire them.

Are there other ways to cultivate human+ skills aside from liberal arts programs? Yes, of course. But in this report, we focus on liberal arts degree programs because they are so clearly geared toward developing these human skills and remain a chief, though not exclusive, pathway through which millions of Americans learn these skills. And, just as these skills are needed more than ever, liberal arts programs are shrinking dramatically. If traditional institutions of higher education are to survive, liberal arts programs will have to embrace the "both, and" mindset by deliberately developing the human+ skills that liberal arts graduates will need to thrive in the future.

The Real, Long-term Career Outcomes of Liberal Arts Graduates

It's important to begin by clarifying the career outcomes and longer-term marketability of liberal arts graduates. We can then ideally help educators and employers understand how these human skills transfer and develop into granular skills in high demand.

There are some wild narratives out there about liberal arts grads. One of the most popular is a wait-and-see approach that suggests that the long-term return on investment (ROI) is much higher for liberal arts majors. Liberal arts majors just take time and ultimately overtake other majors late in their careers. But they don't.

They never catch up to STEM graduates in earnings, but liberal arts majors do perform well in the labor market, achieving substantially better outcomes than workers with less education. Among workers with liberal arts BAs, 82 percent are working (70 percent full-time), and the average full-time worker earns $55,000 annually, $20,000 more than high school graduates, but $5,000 less than the average college graduate (Figure 6).[21] Two out of five liberal arts graduates, however, go on to earn graduate degrees, which further boosts their earnings to $76,000 annually, on average.

Figure 2.

Liberal arts graduates earn a significant wage premium relative to high school graduates, and the half who go on to earn graduate degrees earn an average of $76,000 annually.

75th Percentile Liberal Arts BA

$90,000

Median Liberal Arts MA+

$76,000

Median BA

$60,000

Median Liberal Arts BA

$55,000

Median High School Graduate

$35,000
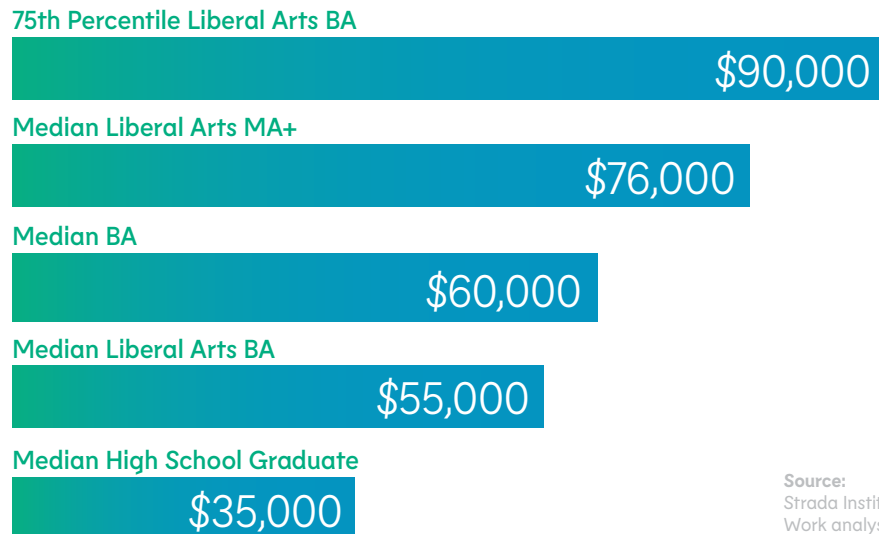
Source:
Strada Institute for the Future of Work analysis of data from the American Community Survey, 2016.

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From their first job to their third job, liberal arts graduates commonly transition into high-skill, high-demand careers in marketing, advertising, public relations, management, and human resources (Figure 3).[22] Conversely, they transition out of low-wage jobs in food preparation and customer service, for example.

Figure 3 illustrates the magnetism of a field such as marketing, advertising, or PR. Liberal arts graduates move in large numbers to this field by their third job. The same kind of dynamic occurs for occupations in management and human resources, where graduates are pulled away from their first and second jobs and move into these magnetic fields with more high-wage and high-skill job opportunities.

Graduates then hit their stride later in their careers, experiencing rapid wage growth in their late 30s and early 40s—the fastest among majors.

They have solid earnings and consistently outstrip certain career-oriented majors, but they don't ever catch up to STEM majors in earnings.[23]

In a fascinating evolution of the market, liberal arts graduates now make up a larger percentage of the tech workforce than technical graduates do.[24] LinkedIn data estimates: "Between 2010 and 2013, the growth of liberal arts majors entering the technology industry from undergrad outpaced that of computer science and engineering majors by 10 percent. Internet or software companies are especially popular—38 percent of all recent liberal arts grads in tech currently work in this space."[25] Companies are looking for intellectual dexterity just as much as they need technical expertise.

Learners are recognizing the power of combining tech fluency with human skills on their own as their careers progress. But the current system too often relies on graduates to navigate blindly from job to job and stumble upon the value of this layering of skills.

It's no wonder, therefore, that confidence in these majors is low, even among those who chose them.

Figure 3.
From their first to their third job, liberal arts graduates gravitate toward marketing careers.

Source:
Emsi resume and profile analysis, 2018.

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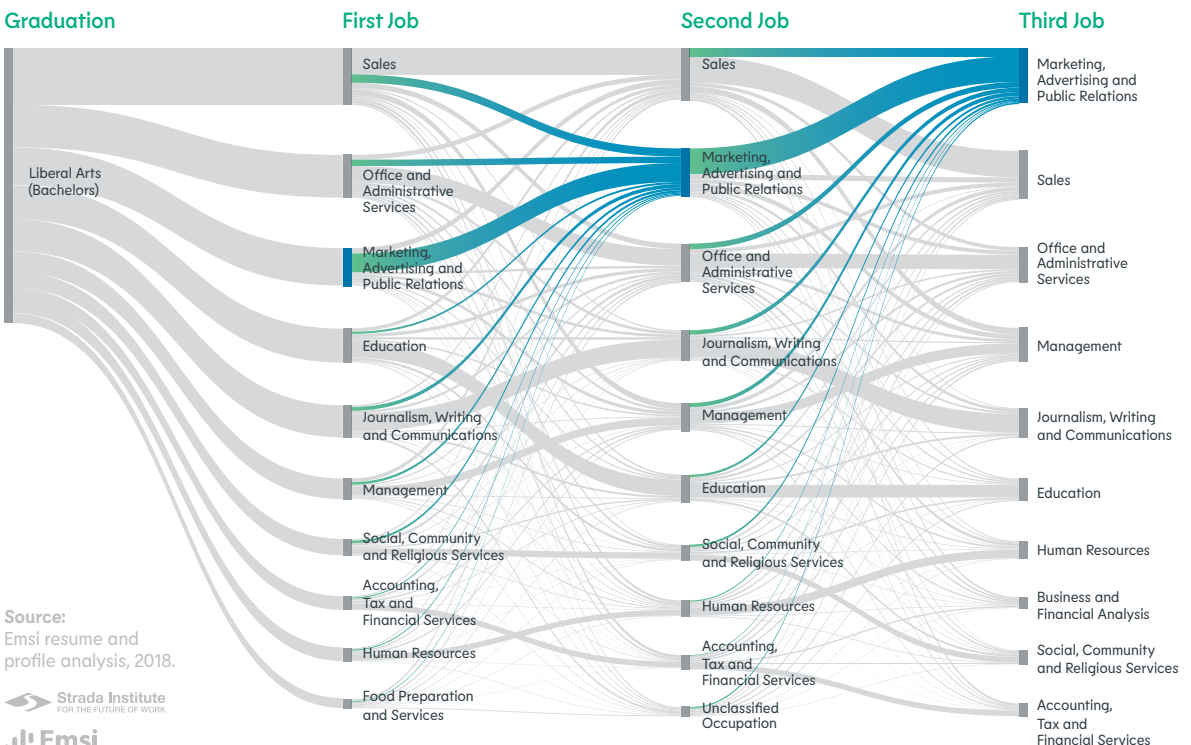
Reconciling Ratings and Outcomes

Over the last few years, Strada Education Network has developed the largest repository of consumer insights about postsecondary education. In partnership with Gallup, we interview 350 Americans, ages 18 to 65, every single day.[26] Having amassed a database of interviews with over 250,000 Americans, we can see that liberal arts graduates rate the value of their education low relative to other majors.

Compared to other majors (after controlling for other variables, such as race, ethnicity, age, term of employment), liberal arts majors rate as the least likely to believe their education was directly relevant to their career: 18 percent of language and philosophy majors and 17 percent of social science majors, compared to 27 percent of STEM majors. Interestingly, however, few college graduates from almost all of the disciplines (except healthcare and education) actually found their coursework relevant or helpful. STEM majors were almost as low as language and philosophy majors, with only 59 percent viewing their coursework as helpful. In fact, they were less likely than those in the social sciences (62 percent) to have a positive perception about the helpfulness of their coursework to their work and daily life.

Figure 4.

Liberal arts majors are less likely than other majors to report that their coursework was helpful or that they acquired important life skills.

Coursework Helpful for Careers

- Healthcare
- Education
- Business
- Social Sciences Cultural Area Studies
- Communications
- Visual & Performing Arts
- STEM
- Language Philosophy

0   20%   40%   60%   80%

Life Skills Learned

- Healthcare
- Education
- Business
- Social Sciences Cultural Area Studies
- Communications
- Visual & Performing Arts
- STEM
- Language Philosophy

0   20%   40%   60%   80%
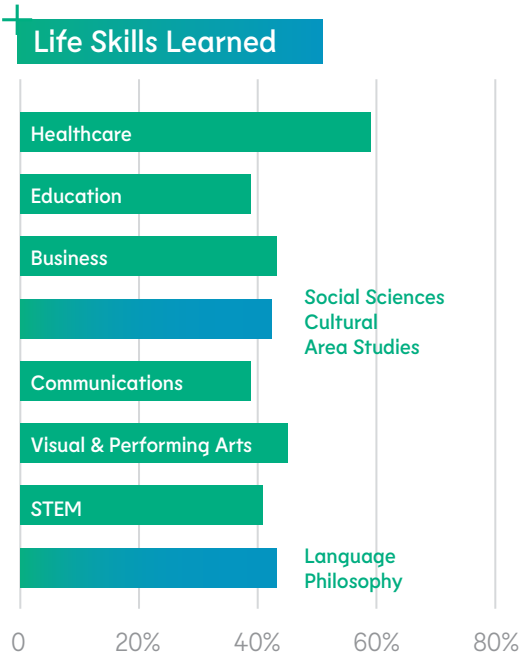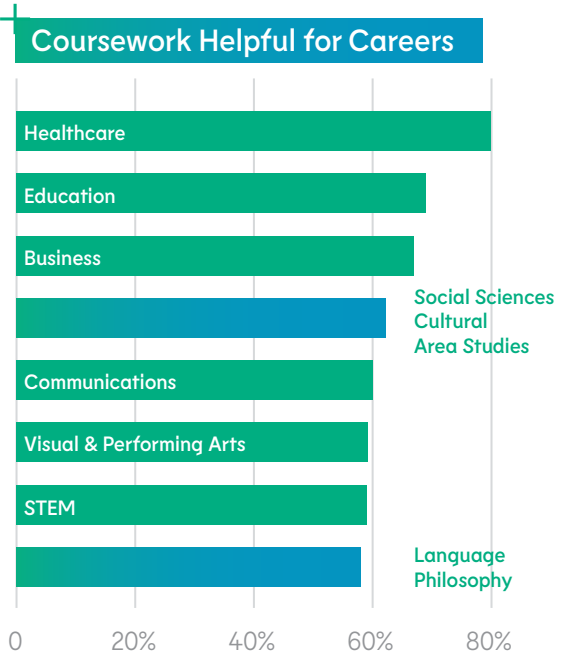
Share of college grads who believe their coursework is helpful for their career

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In addition, both STEM and liberal arts majors also perceive they lack the skills for their careers. Both majors are less likely to have positive perceptions of the life skills they learned through their programs, but interestingly those in STEM have far more doubts about the life skills they've acquired than language and philosophy majors. These are some of the nuances that are lost when people turn only to earnings data to measure the well–being of graduates.

That being said, however, liberal arts majors still are the most likely to express regret about their major, wishing they would have changed their major, though not necessarily to one outside the liberal arts. Forty–eight percent of liberal arts graduates say, if given the choice again, they would have pursued a different major, compared to 40 percent of business majors and 28 percent of STEM majors.

Despite the solid outcomes of liberal arts graduates, the consumer ratings are undoubtedly low. It's not entirely surprising to see such low numbers, as in most cases, liberal arts graduates have had to figure out for themselves how their education translates into labor market opportunities. The rest of this report will highlight the opportunity ahead to improve both ratings and outcomes. Liberal arts degree programs can better address talent readiness with a closer look at the human+ skills needed for the future of work. The first step is decoding how human skills translate into granular skills in demand in the workforce.

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A Rosetta Stone for Skills for the Future

In 1799, a French soldier fighting for Napoleon in Egypt discovered a massive piece of stone inscribed with three languages: two ancient Egyptian scripts and Ancient Greek below them. The Rosetta Stone, as it was called, became the key to deciphering Egyptian hieroglyphs. This stone now has become synonymous with decoding new fields of knowledge.

When it comes to the handoff between education and employment, it is clear that there is great need for a Rosetta Stone. Economist Anthony Carnevale explains, "In spite of its growing economic importance, our postsecondary education and training system and labor market information systems remain disconnected...providing information systems linking postsecondary education and training programs with career pathways is desperately needed."[27] There is a profound gap in how higher education institutions and employers talk about skills. Two frequently cited Gallup surveys found that although 96 percent of chief academic officers[28] believe that they are doing a good job of preparing students for employment, only 11 percent of business leaders agree that graduates have the requisite skills for success.[29] This disconnect is often seen as an indictment of higher education's performance, but the major issue is actually a translation problem.

Educators and employers value the same human skills, but they often use completely different languages to describe them.

Employers do a poor job of signaling their needs. They tend to overload their job postings with a litany of hard, technical skills and then sprinkle in some general human skills of communicating well, providing or receiving feedback, or managing other people well. It's not enough for employers to say they're looking for great communicators, critical thinkers, or collaborators.

In many ways, liberal arts programs are supplying the very competencies employers are demanding, but terms like communication and critical thinking are just too broad; they don't describe the skills a potential employee really needs to be able to do a job. At the same time, college transcripts, in their current format, do little to inform employers of a candidate's abilities; they serve as a rough sketch of a candidate's potential and merely list the subjects to which a person has been exposed but not necessarily mastered. It's unclear what graduates can actually do with that knowledge— how they can apply their learning in a real-world context. These imprecise proxies are the closest approximation of student-learning outcomes, as there are no other assessments available of students' capabilities at the end of a typical four-year college experience.

This, in many ways, is what has spurred the resurgence of competency-based education (CBE) in postsecondary programs, now more aligned to workforce needs. The challenge, however, is that the approximately 600 colleges dabbling in CBE are neither collaborating nor building toward a common taxonomy. They are all quite possibly creating hundreds or thousands of competencies that all mean the same thing but will not have meaning across institutional, state, or employer boundaries.

The translation chasm is vast—so problematic, in fact, that it has sparked a $2.9 billion marketplace of funding for workforce technology.[30] LearnLaunch estimates that between 2015 and 2018, over 240 new companies were funded to address supply-demand mismatch issues, workplace competencies, tech skills, as well as informal and formal training to connect talent more directly to opportunity.

The translation chasm is vast—so problematic, in fact, that it has sparked a $2.9 billion marketplace of funding for workforce technology.

Unpacking Human Skills

Fortunately, we have the ability to use a broad set of labor market information to bridge the gap between educators and employers. Emsi, a leader in the field of real-time labor market analytics, is breaking down these broad terms into much more discrete skills clusters. By extracting the skills from job postings from businesses (demand-side data) and social profiles and resumes from people (supply-side data), we can begin to look underneath traditional occupational classification schemes to observe how specific knowledge and skills cluster with one another. By doing this, we can more clearly diagnose the realities of work, education, and skills requirements, and how skills develop and morph across regions and industries. This is essential because it gives learning providers insights that are more current and certainly more accurate, so that they may develop and refine curriculum and advise learners for a rapidly changing workplace.

Take communication. In Emsi's analysis of over 36 million job postings in 2018, skills like leadership, research, communications, writing, and problem solving are among the most in-demand human skills (Figure 2.1).

Figure 5.
Human skills like communication, leadership, and problem solving are among the most common skills employers list in job postings.

But what does it mean, for instance, when communication skills were listed in 17 percent of job postings in the first half of 2018? How do educators and employers take a broad term like communication and understand how it is deployed differently across various domains?

Frequency in job postings

- Management
- Communications
- Sales
- Customer Service
- Operations
- Leadership
- Innovation
- Problem Solving
- Research
- Presentations

20%   40%

Source:
Emsi job posting
analytics, 2018.

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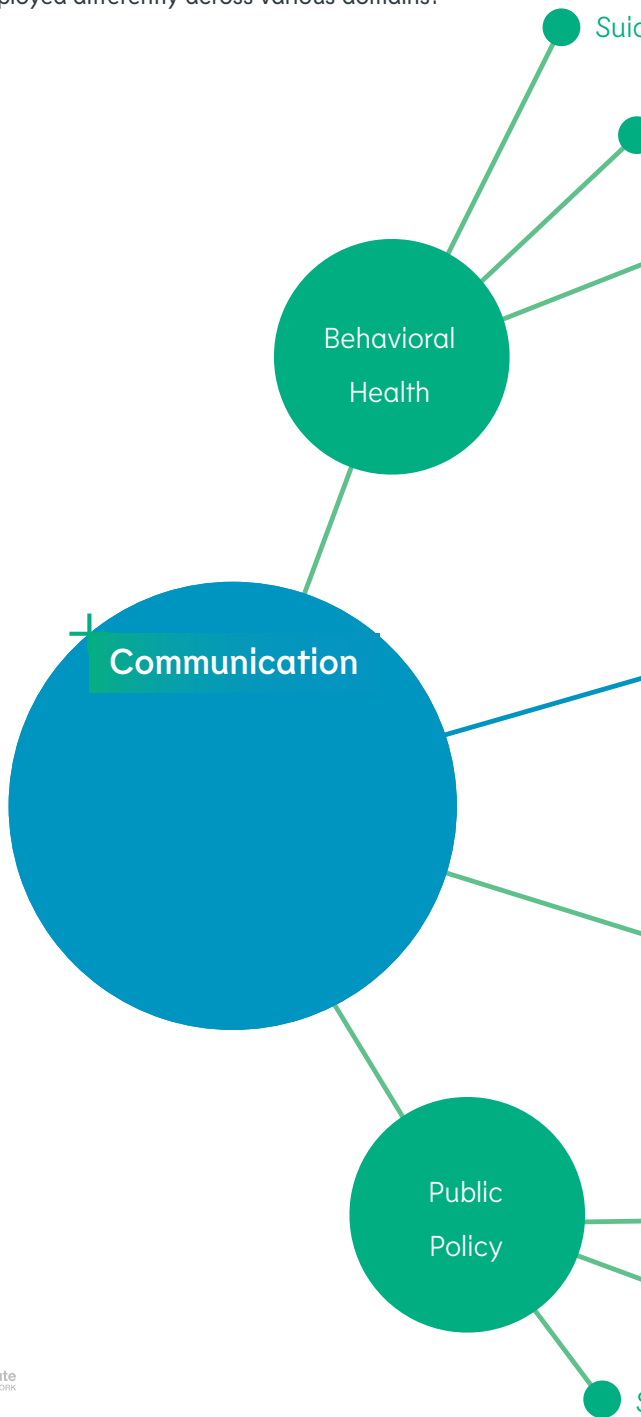
Figure 6.
Liberal arts graduates uniquely translate and apply communication skills in different career fields like marketing, finance, human resources, and public policy.

cide Intervention

Grief Counseling

Crisis Management
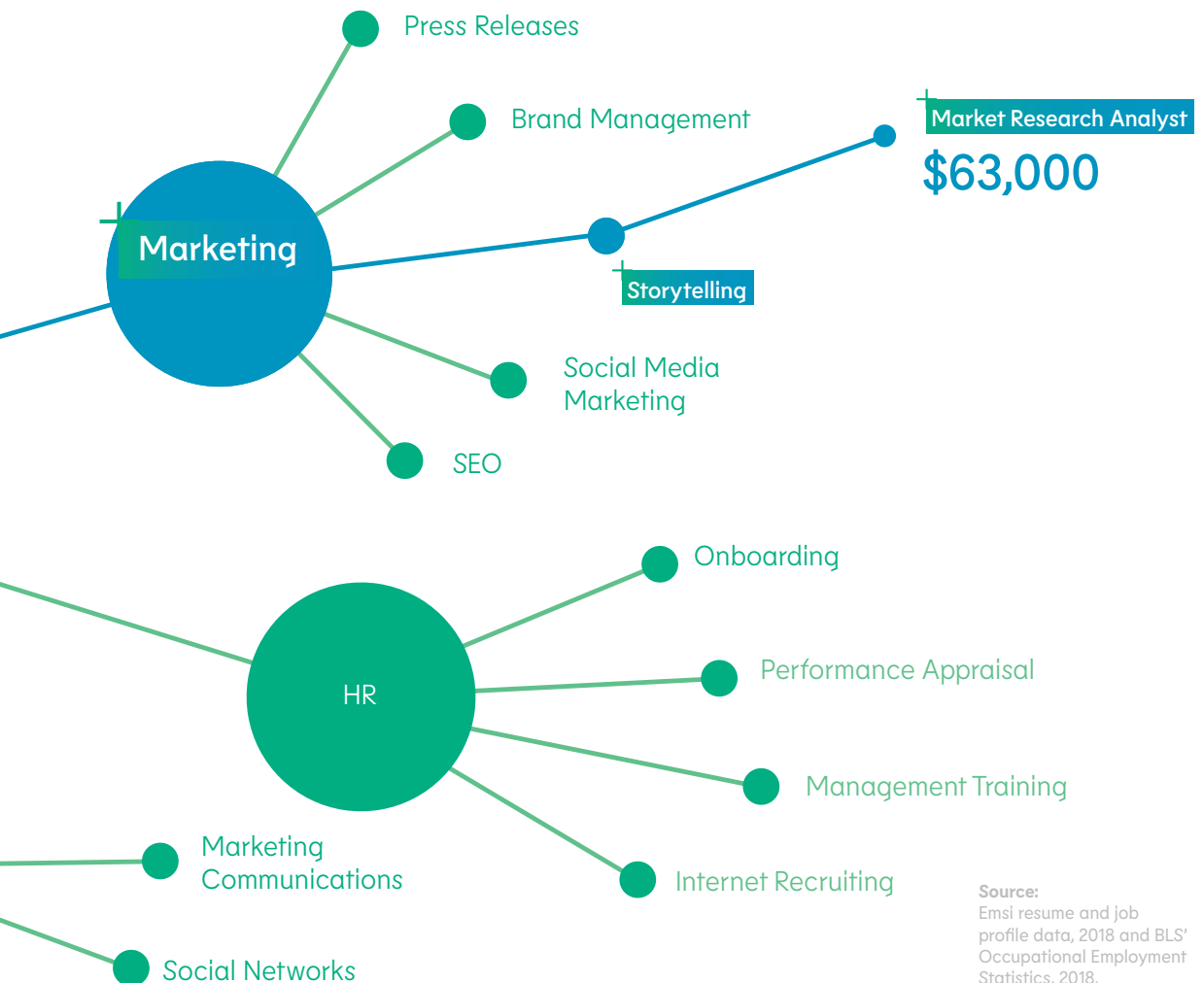
Press Releases

Brand Management

Market Research Analyst

$63,000

Marketing

Storytelling

Social Media Marketing

SEO

Onboarding

Performance Appraisal

HR

Management Training

Marketing Communications

Internet Recruiting

Social Networks

Strategic Communications

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Within the field of marketing and PR, that broad skill translates into capabilities in social media marketing, brand management, press releases, Search Engine Optimization (SEO), integrated marketing strategies, advertising campaigns, WordPress, email marketing, public relations, and storytelling. This is what marketing and PR specialists and employers hiring in that field actually mean by communication. And these skills have discernible value in the market: A person can go on to be a market research analyst or public relations specialist and earn between $59,000 and $63,000 per year or serve as a marketing manager and earn $132,000 per year.[31]

In an entirely different pathway for liberal arts graduates—human resources—communication manifests quite differently. A human resources specialist, earning $60,000 on average,[32] might leverage communication skills by writing employee handbooks or working on learning management systems, onboarding, conflict resolution, engaging in internet recruiting, advising, cold calling, and change management. A human resources manager, who earns an average of $110,000 per year,[33] often uses communication to engage in management training, curriculum development, sales training, performance appraisal, performance management, and retention efforts. By contrast, for those in behavioral health, communication looks more like grief counseling, social services, mental health counseling, and suicide intervention.

The World Economic Forum anticipates that communications will similarly enter more prominently in the field of healthcare: "technological innovations will allow for increasing automation of diagnosis and personalization of treatments, redefining many medical roles towards translating and communicating this data effectively to patients."[34] It makes sense: Even if IBM's Watson might be able to detect that we have cancer, we're not going to want a machine to tell us.

Although employers may ask for somewhat generic-sounding skills like communication, the term itself is far more nuanced. Real-time labor market information provides a clear signal that employers are seeking human+ skills in workers that can transfer from domain to domain. These aren't necessarily certifiable skills, but communication is a foundational human skill that

enables people to thrive in a number of technical settings. Individuals can quickly learn, master, and innovate beyond creating an employee handbook or running a social media account and become specialists.

Problem-solving skills are another good example of this complexity and nuance across sectors.

Figure 7.
Liberal arts graduates translate and apply problem-solving skills uniquely in different career fields like marketing, finance, human resources, and public policy.

Finance
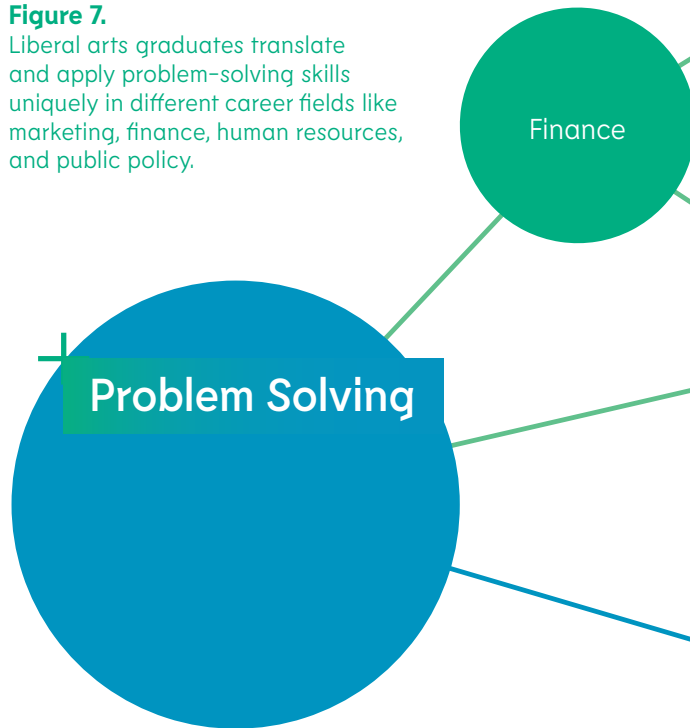
Problem Solving

Source:
Emsi analysis of resume and profile data, 2018, and BLS' Occupational Employment Statistics, 2018.

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Market Research

Lead Generation

Contract Negotiation

Cooperation

Forecasting

Strategic Planning

Strategic Planning

Marketing

Crisis Communications

Customer Retention

Succession Planning

Conflict Resolution

$110,000

HR

Human Resources Manager

Restructuring

Change Management
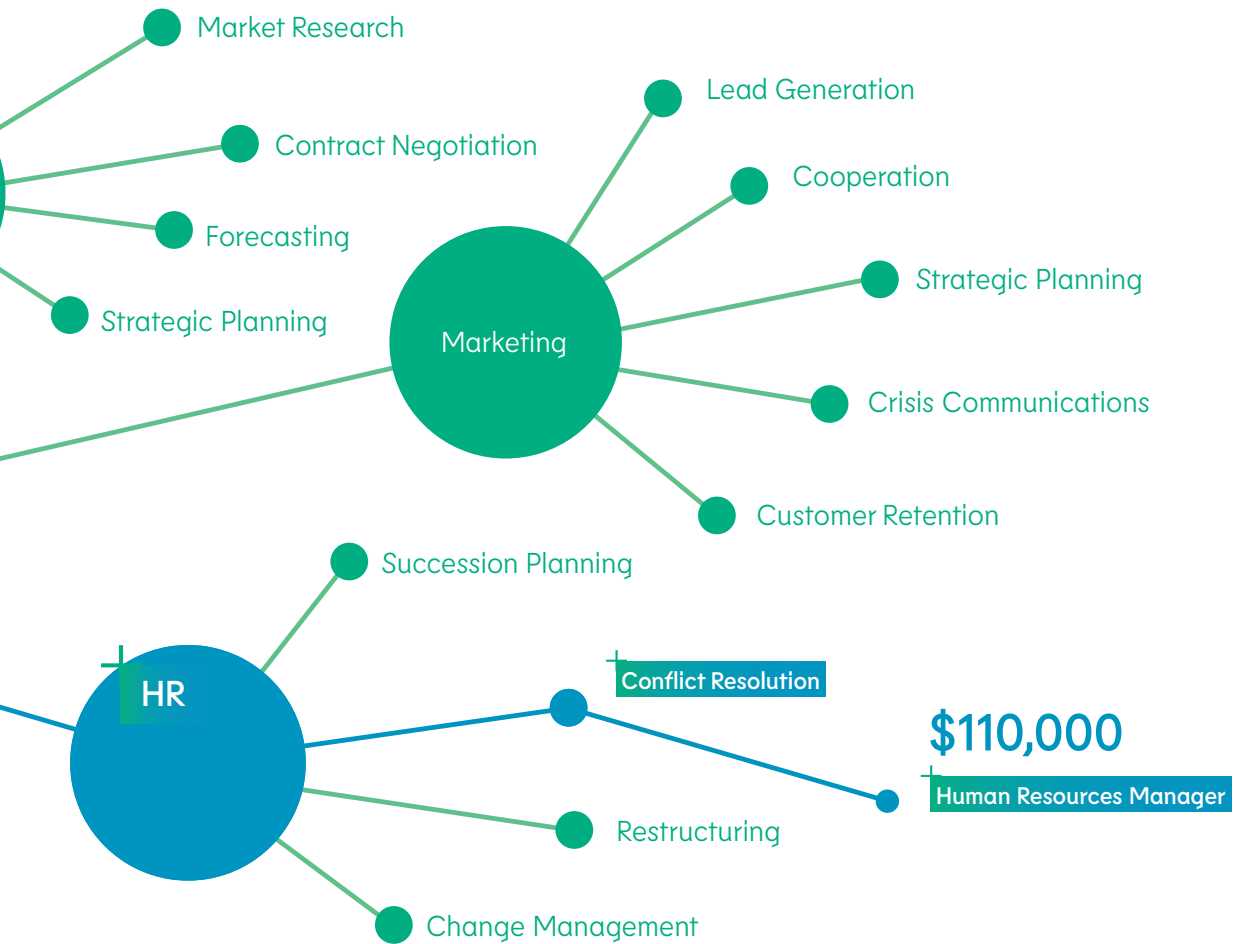
For marketers, problem solving is applied in activities such as strategic planning, crisis communications, customer retention, lead generation, and cooperation, whereas in finance, problem-solving skills are needed for market research, contract negotiation, forecasting, and strategic planning. In HR, problem-solving skills include contract negotiation, mediation conflict and dispute resolution, collective bargaining, succession planning, change management, life coaching, and restructuring. These are the specific skills being validated in the labor market.

And the demand for these skills will not wane over time. The Georgetown University Center on Education and the Workforce estimates that through 2020, the economy will create 24 million entirely new positions.[35] Most of these jobs will be less physically intensive and emphasize skills like active listening, leadership, communication, analytics, and management. The way in which these human skills show up varies greatly depending on the domain in which they are applied.

Human + Tech Skills

If we continue with the earlier human skill of communication and connect it to the domains of journalism, public relations, digital marketing, analytics, and marketing communications, one likely outcome for a person utilizing this human skill might be a public relations specialist. The related job analytics from Emsi show that 73 percent of the job postings related to this field demand social media skills. The skills clusters data tells us that job candidates must be competent in press releases, SEO, Photoshop, broadcasting, and branding. The top in-demand skills are communications, management, writing, social media, editing, research, sales, presentations, innovation, and leadership. How are students supposed to know that they should be thinking about how to apply what they are learning to things like social media marketing—a much needed skill for many employers—as they gear up to transition into the workforce?

Many educators do not rely on real-time labor market data, so how would they know that the demands are shifting and these new technical skills are emerging as re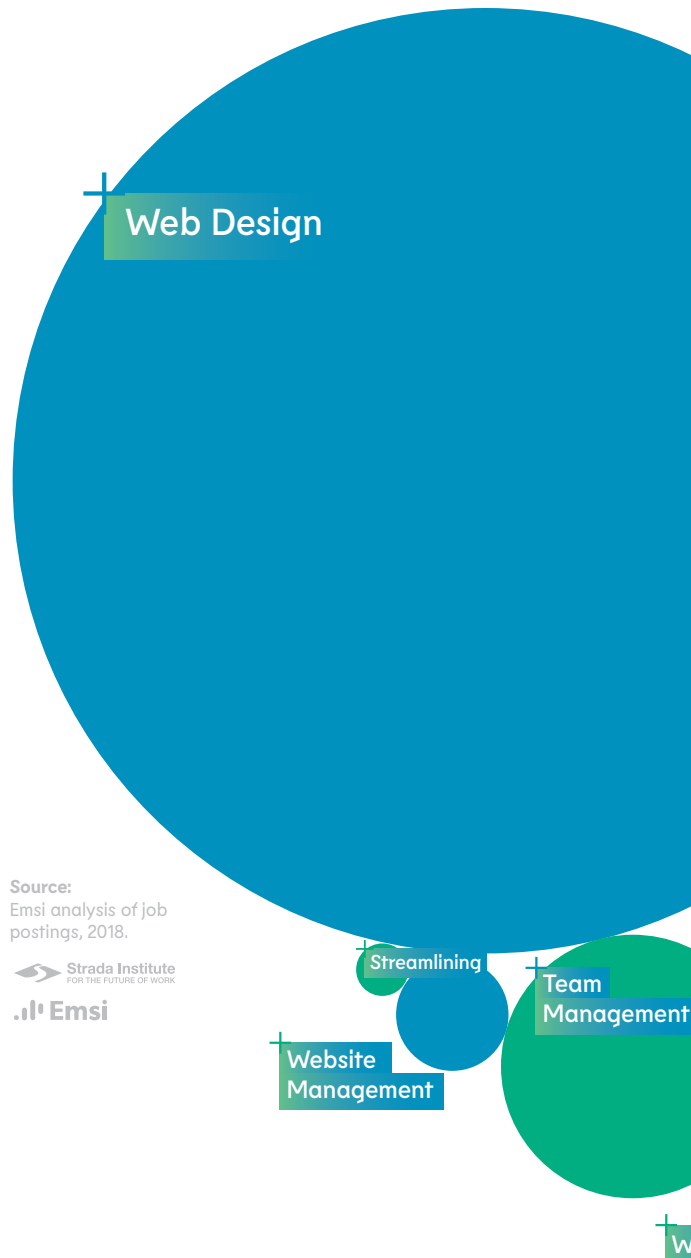quisite skills in the workforce? Programs are not great about advising learners to take on some technical skills to make themselves even more marketable as they enter the labor market. There is an open opportunity for learning providers to use skills clusters data to add career-oriented minors, specializations, add-on services for technical skills acquisition to guide students more clearly to successful career opportunities. Educators in particular need to make it more transparent during a student's undergraduate experience that the labor market is shifting in ways that will require learners to build in opportunities to augment their liberal arts track with certain specializations.

Journalism and writing careers exemplify this lost opportunity. Our analysis shows that liberal arts graduates gravitate toward fields like social media marketing and content management, journalism, digital marketing, media production, and technical writing. For any of these fields, a strong job candidate would need to demonstrate several more technical skills in information technology (IT), business, or design in addition to the core skills of writing and communication.

As an example, journalism is becoming almost an IT field with an increased need for skills and analytics capabilities like search engine optimization, JavaScript, CSS, HTML, and Google analytics.

Figure 8.
Journalism job postings increasingly require tech skills like analytics, SEO, and JavaScript. Bubble size reflects relative demand of each skill.

Source: Emsi analysis of job postings, 2018.
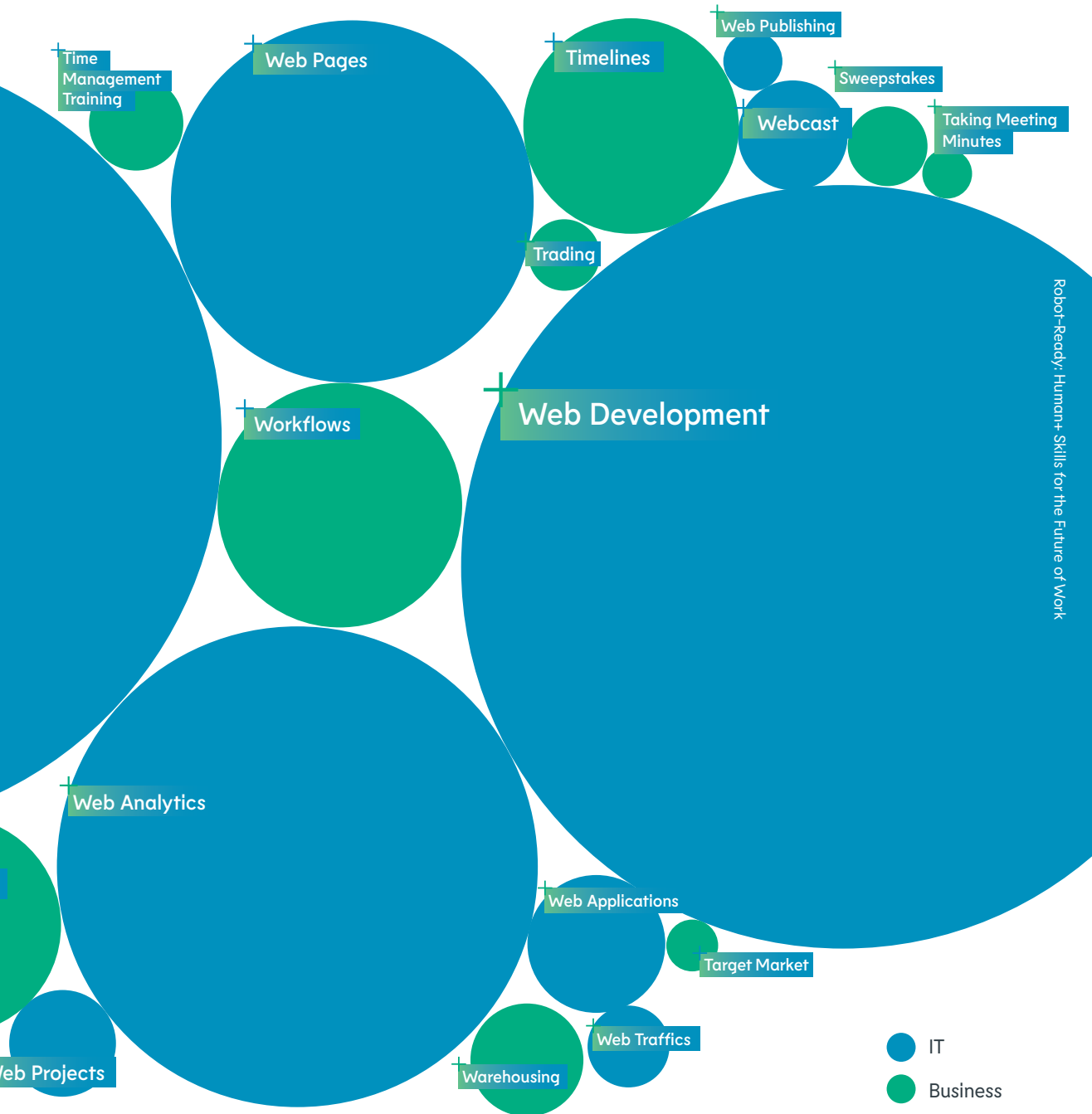
Strada Institute FOR THE FUTURE OF WORK

Emsi

Time Management Training

Web Pages

Web Publishing

Timelines

Sweepstakes

Webcast

Taking Meeting Minutes

Trading

Workflows

Web Development

Web Analytics

Web Applications

Target Market

Web Traffics

Warehousing

Web Projects

IT

Business

At the same time, writing and journalism profiles underscore the need for strong business and marketing skills, including brand work, content development, market research, and advertising.

All of these fields demand IT skills, business skills (such as finance and marketing), and design skills. For those going into technical writing, candidates are now expected to be able to communicate software specifications fluently. They also need software development and project management skills (e.g. Scrum) while having some grasp of project planning, process improvement, and program management. In social media and digital marketing, liberal arts graduates use strong digital analytics skills as well as web design and web development skills.

Learners need better guidance on balanced, more informed pathways to pursue to overcome barriers to entry and set themselves up for success. Imagine how much stronger graduates could be if educators embraced the "both, and" mentality and strengthened both the human and technical skills of liberal arts majors at the same time. If programs were clearer in helping learners more rapidly and efficiently identify complementary skills to pair with their human skills, graduates could command even more in the marketplace and deliver more immediate value to employers in their first job—not just in their third. The trajectory of wage growth would then continue to improve over time from that better position of a first, good high-skills job.

In the end, liberal arts programs must develop clearer pictures of the common careers of liberal arts majors while developing a more precise language for the skills that they will need to develop and take with them as they transition within the job market. Learning providers will fumble the handoff from college to career if learners have no awareness or understanding of these sorts of trends and the growing need for human+ skills.

A Case for Problem-based Learning

Employers are and will continue to be looking for candidates with emotional intelligence, excellent communication skills, intellectual agility, a strong grasp of initiative, and a sense of ethics. The nimble and agile thinkers needed for the future depend on the very skills liberal arts programs cultivate in their students—but the status quo cannot persist. The skills that will help people thrive in the future will entail a "tighter integration between humans and machines than there is today."[36]

If liberal arts institutions are to survive the massive decline in liberal arts majors, they will have to do a better job of demonstrating precisely how vital these skills are both today and tomorrow. As illuminated in this report, educators need to shine a light on the pathways attainable and show how powerful these human skills are, particularly in combination with more technical skills.

The liberal arts can set students up well for a promising trajectory and a high level of mobility. But postsecondary programs can do better. Moreover, if learning providers are looking to develop critical thinkers who can think creatively and nimbly in highly uncertain situations, they must be deliberate about cultivating real-world problem-solving skills.

Small tweaks here and there to our current system will not be enough. A much more fundamental reimagination will need to take place. Gartner analysts[37] say it well: "This presents an enormous opportunity for the fine and liberal arts to re-establish their place in colleges and universities. Their place has been shrinking over the past few decades in response to decreased demand from students, as well as legislative and funding attacks and changes. But higher education institutions will need to change how the liberal arts are taught, collaborate with other disciplines and reflect on the design, ethics and social challenges that face us in a new world."

In order for students to prepare for the new, cross-functional jobs of tomorrow that combine technical and social and analytical skills, they will need stronger advising and career services combined with a 21st-century curriculum that moves away from memorization and standardized testing to problem-based inquiry that fosters creativity, agility, and innovation.

For hundreds of years, institutions of higher education have artificially separated subjects from one another. Salman Khan, founder of Khan Academy, captured the arbitrary "ghettoization" of subjects like genetics, physics, and chemistry as separate fields in his book, The One World Schoolhouse: Education Reimagined, arguing: "All of these divisions limit understanding and suggest a false picture of how the universe actually works."[38]

As a result, students are not adept at making connections across disciplines, connecting one domain of knowledge to another. One of the most infamous examples[39] was when a film crew asked newly minted college graduates from Harvard's and MIT's engineering programs to light a bulb with a battery and a wire. Most of them failed to turn on the light.

Stephen Kosslyn, former Dean of the Faculty of Arts and Sciences at Harvard and the creator of the curriculum at Minerva Project, often talks about this inability for students to move from near to far transfer: "Probably the single biggest challenge that you see in the science of learning is a problem transfer, by which I mean you learn something in one context, typically in a classroom, and then you fail to use it when it's appropriate in different contexts."[40] All too often, students are unable to make connections between their knowledge and real-world applications.

And yet, most of the current literature on the future of work underscores the need for human skills, such as: systems thinking, creativity, critical thinking, high emotional intelligence, communication, agility, resilience, and flexibility. Employers are looking for candidates who can respond well in highly ambiguous situations and demonstrate a strong grasp of initiative, resolve, and ethical judgment. And yes, many are also looking for STEM skills.

So how exactly do learning providers prepare the students for uncertain futures when they continue to teach in silos? How will learners become creative, resilient thinkers for highly ambiguous scenarios in the future when learning continues to be scaffolded in artificial ways?

Postsecondary programs are going to have to present our students with real-world problems to solve. Learners will need to struggle with connecting concepts across a multitude of disciplines. And in the context of that problem-based learning (PBL), they will learn—just in time—the kinds of theories and mathematical or other concepts needed to apply to the challenges ahead. The National Academies of Engineering developed a Grand Challenges Scholars Program in 2007 to prepare undergraduates with a hands-on, interdisciplinary, research-based curriculum that encourages entrepreneurship and global, service learning, problem-based inquiry. Olin College embodies this philosophy by not having different departments. Students and faculty engage in learning but through a blurring of boundaries that centers on problem-based learning. At times, even a single course can combine what in most universities would be three different courses.

This doesn't mean, however, that the opportunity to engage in PBL is relevant only to disciplines like engineering or computer science; PBL is not just for the future engineers of the world. This goes for all of the disciplines that are taught on campus or online. In many ways, K-12 schools have picked up on PBL much more quickly than institutions of higher education. Nevertheless, across the gamut of educational experiences, this movement to break down artificial departmental silos has not yet scaled widely.

We know that whenever humans solve any problem in the world, the solution is and will be, by nature, transdisciplinary. As much as colleges and universities believe that they are preparing students with the skills to adapt to any conceivable situation, the underlying structures of our postsecondary system betray how stovepiped these efforts are. A core curriculum, distribution requirements, cross-listed courses: These are inadequate and artificial ways of creating the next generation of systems thinkers. How might learning providers better empower students to be nimble agents of the future?

With stronger PBL models, it will be easier for education providers to stay ahead of the curve and build in new and emerging skill sets in data analytics, blockchain, web development, or digital marketing that students will need in order to be successful in the job market. Especially as workers turn to learning as a lifelong pursuit, if colleges and universities do not incorporate the technical skills in demand, learners will look to alternative learning providers for short-burst programs that increase their relevance in the workforce. Institutions of higher education will begin to compete with upstart organizations like Pluralsight or Revature—and others they have never heard of—that are laser-focused on skills development.

The world will need more agile and resilient thinkers with a serious handle on various technologies and digital literacies. Those workers will need both human and technical skills. The integration of scenario-based learning into the classroom would bring more clarity to how human+ skills translate into real-world problem solving and workplace dexterity.

The Evolution of Advising Services

If liberal arts institutions are to continue to have an impact on developing adaptive thinkers for the future of work, they'll need to be able to show the value of these degrees by articulating pathways more clearly. Advising and career services would need to be embedded early on in the learning experience to help shape learning pathways. Better coaching would guide learners and help them build awareness of the kinds of technical skills they'll need to acquire along the way. This cannot occur close to graduation. Instead, it requires intentional planning by postsecondary learning providers.

The career success of graduates is critical to the brand of any institution—no matter how prestigious the college or university. Consumer ratings of liberal

arts programs are very low and illustrate that graduates negatively perceive the value, relevance, and helpfulness of these programs.

Although many graduates seem to be thriving, on average, learners have neither been advised well, nor do they understand the pathways and the payoff of these skills. In most cases, liberal arts graduates have had to do the heavy lifting themselves in terms of figuring out how their majors translate into the skills in demand in the workforce. They didn't have help in navigating this translation process. How will educators and career services staff members work more closely together to prepare learners better for a rapidly evolving future that is being reshaped by advanced technology, such as deep learning, robotics, and data analytics?

The good news for advisers is that learners who are seeking to go into STEM fields should certainly do so. The demand is there, and the rewards are great. STEM workers earn 29 percent more in wages compared to non-STEM workers, and STEM job growth soared to 24 percent in 2017 versus 4 percent for all non-STEM occupations.[41] There is simply not enough supply of STEM talent to meet the demand. This report in no way intends to sway potential STEM majors from specializing in these disciplines, but it does illuminate the need for a balanced approach that includes an amplification of the human skills alongside the technical skills. We see initiatives emerging like the Degree+ program at Purdue, which allows students to add on a liberal arts degree to their chosen major in a 3+2 program.[42]

At the same time, advisers and educators can assure learners who genuinely hew to the arts and the humanities that they do not necessarily need to sacrifice their passion for a more career-oriented major. There will be a place for what economist Lawrence Katz calls "the new artisans," those who can leverage their uniquely human abilities—"flexibility and flair"—to interact with others more personally than robots can.[43] Advisers will, however, have to guide learners on how their competencies translate into the workforce more concretely and where they may need to augment their technical skills.

A liberal arts education can, in fact, enable learners to learn for a lifetime, but it's not some magical phenomenon. It takes work, effort, and awareness to identify the skills that enable learners to make themselves more marketable and break down barriers to entry. It's important for learning providers to illuminate the well-trodden pathways of liberal arts graduates: Where do they go? What fields do they tend to land in? Do students similarly wish to pursue pathways in PR, advertising, marketing, HR, financial analysis, management, or education?

Learning providers will need to embed the technical skills acquisition into their course loads, whether it's through minors, certificates, certifications, industry-recognized credentials, or bootcamp programs. There is much talk regarding the concept of a stackable credential, but colleges and universities have yet to work in smaller, more modularized paths other than two-year degree or educational certificate programs. Are there also ways in which learners can integrate real-world work-based learning experiences through internships, apprenticeship, co-op programs, or experiential learning programs?

The jobs of the future will center on hybrid skills—human skills mixed with a cross-disciplinary set of more technically oriented skills. HR expert Josh Bersin explains that these new hybrid jobs "do not lend themselves to static job descriptions and simple job titles. They are jobs that require technical, industry, managerial, and integrated thinking skills; they often require skills in communication, persuasion, and teamwork."[44] The need for high emotional intelligence, interpersonal and management skills, strategic and critical thinking will never go away no matter how many robots working learners encounter in their journeys ahead. With a more thoughtful redesign around a clearer integration of human+ skills, educators will be able to help more learners thrive in a future full of uncertainty and change.

Taxonomy Matters...A Lot

Our education and employment systems are not meeting in the middle to enable smooth transitions for all learners. Why does this matter? Why can't we keep muddling our way through?

Future workers will need to "virtuously combine technical and interpersonal tasks"[45] repeatedly throughout their working lives. This isn't just about a single transition from education to work, but a series of transitions over a lifetime, as workers cycle through education to learn new skills or transition between career fields. It's bad enough to allow people to muddle through once, but it would be an enormous waste of time, talent, and economic productivity to have them do it over and over again.

If predictions about the future of work are borne out, the skills liberal arts graduates learned in their programs will continue to serve them well. For when it comes to the future of work, there will be a need for more learners who know how to think on their toes—who can problem solve in the most uncertain and ambiguous of situations. As technologies or entire jobs become obsolete, workers who can adapt and learn how to solve new problems in the market will thrive. But learners need help in navigating and translating their skills into the language of the marketplace while ensuring they have the right technical skills to augment their human skills.

Today, the concept of a career is in flux. It's not just because of the widely covered job–hopping tendencies of millennials. In a longitudinal study of baby boomers by the Bureau of Labor Statistics, even younger baby boomers held an average of 12 jobs from ages 18 to 48.[46] The number of jobs a learner will hold will only increase with time and especially due to the volatility of technological advancements across all industries.

Adult workers can already sense that things are different now. Pew research reveals that 87 percent of adults in the workforce today acknowledge that it will be essential or important for them to get training and develop new skills throughout their work life to keep up with changes in the workplace.[47] They can no longer view learning as linear. Indeed, with life spans projected to extend as long as 150 years in the future, two, four, or six years of learning on the front end of a 100–year work life will not be enough. Learning and ongoing skill development will become a way of life.

Even the concept of a T-shaped person will become outmoded. A T-shaped person—an idea that emerged in 1991 and was popularized by IDEO and McKinsey—describes a person's combination of breadth of knowledge with the verticality of technical expertise.

But a T-shaped person will no longer thrive in a world in which our work lives become longer and more turbulent because of advancements in technology. Learners of the future are going to episodically seek out some sort of postsecondary education over and over again throughout their long working lives.

Figure 9.
T-shaped individuals combine broad knowledge and skills with deep expertise in a narrow field.
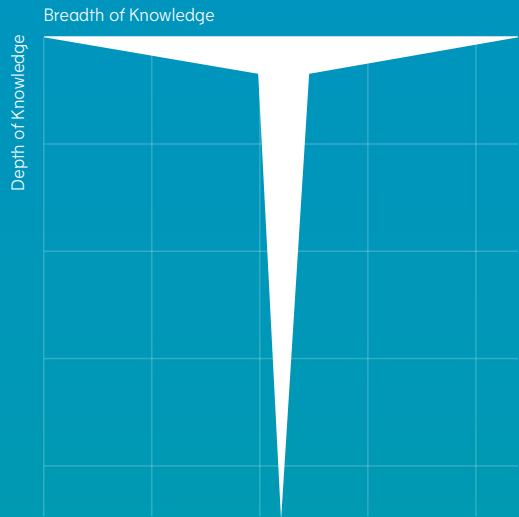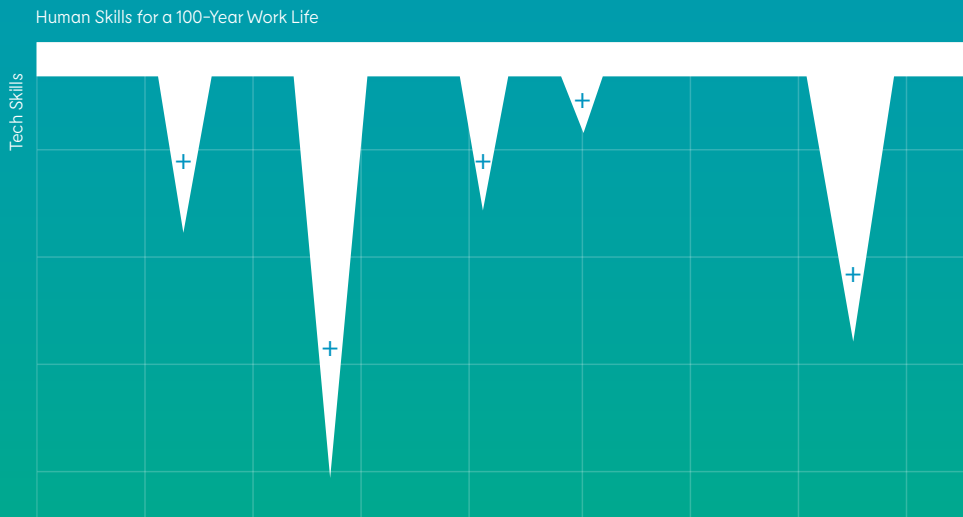

Breadth of Knowledge

Depth of Knowledge

Figure 10.
In the future, workers will need to return to learning throughout a 100-year work life.

Human Skills for a 100-Year Work Life

Tech Skills

There will be more vertical offshoots throughout our 100-year work lives as workers transfer from domain to domain. As the Council on Foreign Relations explains in a recent task force report:

Americans will need to reimagine their careers; the average worker will know over a dozen separate jobs during his or her lifetime. Citizens will also need to rethink education, jettisoning the notion of education as something largely completed before they enter the workforce. Instead, lifelong learning and periodic retraining will become the new normal.[48]

People will need flexible, on-demand pathways that tie education to economic relevance. This will entail new financing tools as well as assessment tools.

How Will We Pay for Lifetime Education?

We know that workers will seek out opportunities to reskill and upskill throughout their lives, but to date, there exist few forms of financing for short-term training programs that would enable learners to leverage their human skills to learn new skills that are in demand. The Council on Foreign Relations explains that more Americans need help in navigating the challenges associated with the future of work: "U.S. policy has put the onus on workers to find new employment with little outside assistance."[49] Income Share Agreements (ISAs) are an emerging tool in the market but are still quite new, and most traditional tuition-reimbursement programs apply only to accredited institutions, which often do not teach the targeted, cost-effective programs that learners may be seeking.

Many look to Singapore's SkillsFuture work, which offers a lifelong, top-up program for Singaporeans to access skills-based training to keep up with technological advancements and competition for jobs. Is there a way for the U.S. to think similarly about lifelong or lifetime learning accounts that would enable working learners to pay for short-term training throughout their 100-year work lives? These kinds of financing tools will be critical to the welfare of working adults.

A wait-and-see attitude will not suffice. CFR aptly notes: "A policy of waiting and hoping that the market will sort out the challenges...is not an adequate response. Failure to provide the education, training, and resources that Americans need to seize these new opportunities, and to use policy tools to spread the benefits of technology more widely, will leave millions of Americans to face lives of diminishing prospects."

Our system is brittle with few off-ramps for advancement for workers to obtain new skills by moving seamlessly in and out of learning and work. Financing this new ecosystem of lifetime education will require innovative investments and long-term strategies to produce the human+ skills that are complementary to and irreplaceable by the technologies of the future.

Employers, too, will need to reimagine on-the-job training to include enabling workers to move into new fields and better jobs. How might they build interventions to help workers amplify their uniquely human skills in the face of automation?

The Assessment Void

The learning ecosystem of the future will have to facilitate more seamless transitions in and out of the workforce. In order to do that work, there need to be better assessment tools and prior learning assessments to take any person and assess where they are: What capabilities, skill sets, and mindsets do they have? What are their gaps in relation to their goals in life? People will need ways of translating their skills from one industry to another. How does someone begin to understand that perhaps 30 percent of what they already know could be channeled into a totally different and potentially promising pathway they never even knew was within reach?

In a 100-year work life, what will be the way to assess all of the personal and informal learning that has occurred through people's various work and life experiences? To this day, there are few ways of measuring what Peter Smith calls the "hidden credentials" of adult learners.[50] Because colleges and employers have historically failed to recognize the hidden credentials in everyone: "[W]hat you know is valued based on where you learned it, not how well you know it and can apply it."[51] Smith calls this "gross knowledge discrimination" "wasteful" and "destructive" to both learners and to the economy.[52]

Working learners will need better competency maps and tools to build career paths for the transitions
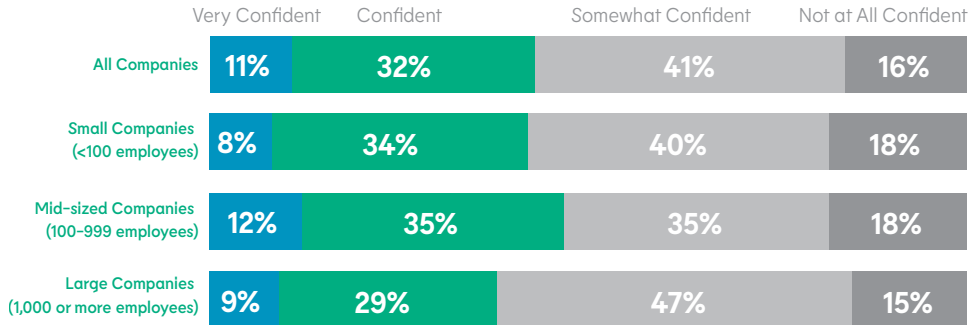
ahead. And there will be many transitions to come. They'll also need better information to understand whether in some cases it's better to pursue a certification, a nanodegree, a bootcamp, or a degree program to get them where they need to go. A new venture-backed assessment company called Imbellus is trying to change the conversation from assessing what people know to assessing how people think. Through simulations built within natural world settings, the back end of the technology measures every click, mouse movement, and time stamp in order to make inferences about a participant's information-processing, decision-making, and problem-solving skills—how they make choices and how they think through problems. It is a game simulation that directly engages learners in problem-based learning and "what happens to humanity based on the choices [they] make."[53]

The learning ecosystem of the future will need more human+ skills assessments—more robust ways of measuring and assessing curiosity, creativity,

Survey with small, mid-size, and large companies, 57 percent of employers lack confidence in their company's ability to identify and recruit highly qualified job candidates.

This crisis of confidence has been reflected worldwide. The PwC CEO Survey on the Talent Challenge shows that 93 percent of CEOs recognize "the need to change their strategy for attracting and retaining talent. But an enormous 61 percent haven't yet taken the first step. CEOs are well aware that something needs to be done, but are less sure of exactly what that is."[54] At the same time, they lack confidence in their HR departments: Only 34 percent felt that HR was well prepared for the task ahead. The costs of recruitment are on average $4,000 per applicant, creating a worldwide recruitment market in excess of $200 billion.[55] With huge inefficiencies in the system, it is no wonder that employers feel uncertain of their future prospects in better matching talent to demand.

Figure 11. Less than half of managers feel confident in their company's ability to spot and recruit the best talent for the job.

	Very Confident	Confident	Somewhat Confident	Not at All Confident
All Companies	11%	32%	41%	16%
Small Companies (<100 employees)	8%	34%	40%	18%
Mid-sized Companies (100-999 employees)	12%	35%	35%	18%
Large Companies (1,000 or more employees)	9%	29%	47%	15%

flexibility in problem solving, choice making, and the list goes on. As workers access more affordable, flexible options to retool themselves in an agile manner, how will they signal mastery of new areas of expertise to employers? Without more innovation in the assessment space that can yield insights into the human skills of job candidates, there will be no way to harness and display the learning that occurs beyond traditional institutions of higher education.

This is critical because employers are already experiencing a crisis of confidence when it comes to identifying talent. In our Strada-Gallup Employer

Although there are hundreds of companies working on innovative solutions to this seemingly intractable problem of better matching and upskilling human capital to the opportunities out there, there is a huge void when it comes to assessment. Working adults are going to experience more career transitions than they ever dreamed. We will therefore need more solutions leveraging a Rosetta Stone of human+ skills.

Conclusion

The good news is that the opportunities ahead are vast. But they do not include clinging to the status quo. Policymakers, employers, educators, and learners must work to make education-to-employment pathways more seamless and frictionless in the future:

+ Learning providers
can better advise students on technical skills acquisition and develop innovative and interdisciplinary problem-based learning (PBL) curricula that effectively foster human skills like critical thinking, choice-making and judgment, and collaboration.

+ Learners
pursuing a liberal arts education can seek out career-oriented learning opportunities to cultivate technical skills that augment and apply their human skills, such as earning a minor or certificate in career-oriented programs or bootcamps that provide last-mile training. They should also embrace work-based learning opportunities such as internships, apprenticeships, mentorships, co-ops, and experiential learning programs.

+ Employers
can more effectively articulate the human and technical skills they are seeking, utilize skills- based hiring, and reimagine on-the-job training to cultivate workers' uniquely human skills.

+ Entrepreneurs
have a greenfield opportunity ahead to fill a massive void in the workforce tech marketplace—to innovate and build robust ways of measuring and harnessing human potential no matter where learners are in their work lives.

+ Policymakers
can create new incentives centered on the cultivation of human skills and invest in a Rosetta Stone for skills: data systems and a common framework that learners, learning providers, entrepreneurs, and employers can utilize.

As technology such as artificial intelligence advances and in many cases becomes the top candidate for the work ahead, future workers will need to flex their human skills—their higher order mental capacities and ability to work with ideas and think divergently—to distinguish themselves alongside the miraculous machines of the future.

In preparation for the robot future ahead, there is a lot of work to do in aligning and decoding taxonomies. It's time to focus on a Rosetta Stone that can translate skills between employers and postsecondary training systems by unpacking the granular meanings of human skills that are being supplied in postsecondary programs and are in demand in the workforce. Workers' uniquely human skills will only grow in value in the learn-work-learn ecosystem of the future, but working learners won't be able to move seamlessly in and out of learning and work without significant investment in and strengthening of programs that cultivate these human+ skills.

Liberal arts programs may be well positioned to prepare students for the work of the future; however, our current views on the liberal arts are often polarizing and oversimplified. This paper was designed to bring more nuance and rigor to the conversation. Liberal arts graduates are neither doomed to underemployment, nor are they prepared to do anything they want.

We found a complex picture of the human skills that liberal arts graduates deploy in the marketplace. Two things are abundantly clear: The liberal arts are teaching high-demand skills that could be transferred from domain to domain, but they do not provide students with enough insight into the pathways available and the practical grounding to acquire before they graduate. The liberal arts can give us the agile thinkers of tomorrow, but to live up to their potential, they must evolve.

If everyone stands still and does nothing, employers and educators will continue to develop on parallel tracks, speaking two very different languages. We must work toward a modern-day Rosetta Stone to decode the human+ skills needed for the future. With a better understanding of jobs, talent readiness, and educational pathways, we can begin to connect our workforce with our postsecondary education and training system and build promising pathways for the future of work.

Robot-Ready: Human+ Skills for the Future of Work

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Appendices

Appendix 1. Data Sources

The **Emsi profile database** is a collection of social and professional profiles that include information about an individual's employer, job title, skills and certifications, and more. It currently includes over 106 million unique profiles, which have been aggregated and de-duplicated from the open web. Sources include major online resume, social networking, and professional networking sites where individuals voluntarily share their own information. This data provides colleges and universities insight into the employment outcomes of their graduates, enables economic development and workforce professionals to understand and market their region's workforce, and helps businesses find and recruit the talent they need to grow. Find out more at www.economicmodeling.com.

Strada Consumer Insights analyzes four surveys from the Strada–Gallup portfolio of primary research about the connections between education and work: The Education Consumer Survey, Current Student Survey, Alumni Survey, and a nationwide survey of employers. The Strada–Gallup Education Consumer Survey includes questions about graduates' earnings, perceptions of their major and coursework's relevance and helpfulness to their career, acquisition of life skills, and subjective well-being. The current student and alumni surveys measure current and former students' perceptions about their support and satisfaction with their education. The Employer Survey asks direct and hiring managers their perceptions of and satisfaction with hiring processes and factors connected with job success.

Integrated Postsecondary Education and Data System. IPEDS is a store of data that includes information from annual surveys administered to postsecondary institutions. All postsecondary institutions that receive federal aid under Title IV of the Higher Education Act are required to complete these surveys. IPEDS includes information about degrees conferred by Title IV institutions and the field of study in which they were awarded.

American Community Survey. The ACS is a monthly cross-sectional survey of 250,000 households or 3 million households each year. The ACS includes information about respondents' educational attainment, employment status, hours and weeks worked, and earnings, which we use to analyze liberal arts graduates' earnings.

Occupational Employment Statistics. The OES is a semi-annual survey of 200,000 businesses that collects data on employment and wages by occupation.

Appendix 2. Methods

How do you define "liberal arts"?

Across data sources, we define liberal arts at the program or major level as including humanities, social sciences, and interdisciplinary programs. Our analysis only comprises bachelor's degree programs, as they are the most traveled liberal arts pathways in postsecondary education. In our examination, we distinguish liberal arts majors from majors that are more career-oriented, such as business and healthcare, as well as the physical sciences, as they are more often grouped with STEM majors in common parlance.

You explain that you exclude the physical sciences. Why is that?

Physical sciences, though historically included as part of a broad liberal arts education, are more commonly defined as STEM at the major and program level. We do, however, include interdisciplinary liberal arts programs in our definition.

Are arts majors included in your analysis?

Arts programs are becoming increasingly career-oriented in nature, given the rise of majors in graphic design or multimedia studies: 30 percent of arts degrees are in graphic design or film, video, and photography, for example. Moreover, in terms of their labor market outcomes, arts majors look markedly different from humanities or social sciences majors.

Why focus on liberal arts majors instead of liberal arts institutions or liberal arts core curricula?

We focus specifically on liberal arts majors in order to connect programs—not institutions—to learners as the fundamental unit transferring economic value in the labor market. As economist Anthony Carnevale explained in a recent **Washington Post** op-ed: "A career begins...with what a person majored in, not so much by where that person got the degree. What you earn depends much more on what you take in college than where you go. From a career perspective, college is more a market in program majors than a market in institutions."[56] Certain elite institutions may carry value through brand names, but caveats exist even when it comes to prestigious institutions. Moreover, for the 90 percent of students attending non-elite institutions,[57] majors matter when brand doesn't. We also focus on majors because there are greater opportunities for actionable insights for learners in particular. For more research and insights on the importance of program-level data, see **Degrees of Opportunity**[58] by Mark Schneider and Rooney Columbus and **The Economic Value of College Majors**[59] by Anthony Carnevale, Ban Cheah, and Andrew Hanson.

By focusing on liberal arts majors, are you inadvertently excluding underserved populations like low-income students?

Although low-income students are slightly less likely to pursue a liberal arts education than those from middle- and high-income families, a significant share of undergraduates enrolled in liberal arts programs are from low-income families. For example, data from National Postsecondary Student Aid Survey reveals that 32 percent of students enrolled in liberal arts programs are Pell grant recipients, compared to 29 percent of students majoring in other fields.[60]

How are you measuring earnings?

We include earnings measures from a few different sources: earnings from employment for full-time workers employed year-round by using the 2016 American Community Survey, personal annual income from the Strada-Gallup Education Consumer Pulse, and annual wages by occupation from the Bureau of Labor Statistics' Occupational Employment Statistics.

How did you measure liberal arts graduates' trajectories from their first jobs to their third jobs and their career fields?

We used Emsi's resume and social profiles database for workers with liberal arts BAs to identify their first, second, and third jobs and the career fields in which they hold those jobs by using the Bureau of Labor Statistics' standard occupational classifications (SOC). We classified BLS occupations into 80 subgroups (e.g. a marketing, advertising, and public relations; and human resources) to illuminate graduates' career outcomes more clearly.

How did you measure the demand for skills in different career fields?

We used Emsi's job postings data to analyze demand and its resume and profile data to analyze supply. We analyzed the co-occurrence of skills in order to understand how skills coalesce and morph into roles, as well as factor analysis to understand how roles evolve. Our analysis focused on skill prevalence—how frequently the skill is listed in job postings across the job market—and skill relevance—how central a skill is for explaining a role. This distinction allows us to understand roles more clearly. In addition, because we focus on how skills coalesce into roles, we can begin charting learning pathways.

## Appendix 3. Liberal Arts Graduates' Labor Market Outcomes

Despite the fact that liberal arts graduates largely have been left on their own to navigate the labor market, they have, on average, achieved positive labor market outcomes in the long run. It's important to be precise about the long-term career outcomes for these graduates. Liberal arts graduates, on average, ultimately transition to magnetic, high-skills career areas with good earnings. Are the earnings as strong as a business major or a STEM major? No, but in spite of all of the stumbling in the dark, they do find a path forward.

Real-time labor market data illuminates exactly what liberal arts graduates are doing with their majors. They move around a lot, migrating between industries and occupations. This career evolution is often mistaken for a kind of aimlessness. The popular narrative supposes that these graduates have the worst career outcomes as a result. The data doesn't support that.

Liberal arts graduates start out behind STEM, healthcare, and business majors in earnings, and their relative position remains largely unchanged over the course of their careers.

Figure A3.1.

Liberal arts graduates never catch up to STEM, healthcare, or business majors' earnings, but they have the fastest income growth among majors in their late 30s and early 40s.
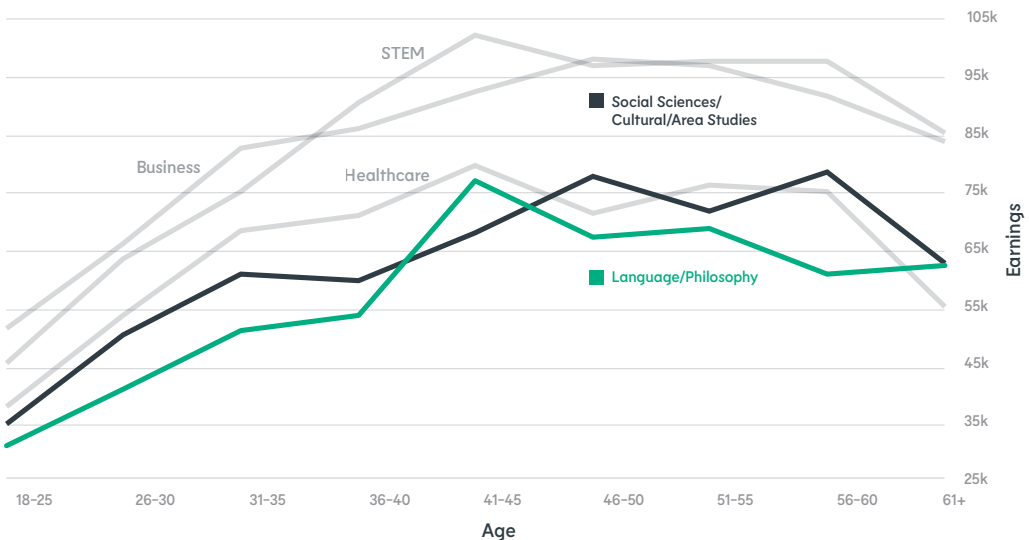
Source: Emsi analysis of data from the Strada-Gallup Education Consumer Survey, 2018.

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No competencies are rewarded more than STEM competencies in the labor market, and STEM majors out-earn all other majors from start to finish of their careers. Of course, earnings is far from the only measure of career or life success, and we shouldn't necessarily think about the differential outcomes across majors as a rat race or a zero-sum competition. But it is important to note that liberal arts graduates fare well in today's market. Not all liberal arts graduates become baristas, nor do they all go to graduate school or become teachers.

Their career diversity stands in stark contrast to many other fields. In information technology, for example, 61 percent of new graduates work in one of two fields and stay in those fields: software development and IT networks and systems. Seventy percent of liberal arts graduates, on the other hand, change careers from their first to their second job.

They have high rates of career mobility compared to the mobility rates of other majors: 53 percent for IT majors, 54 percent of allied health majors, and 59 percent of education majors. Across every career field, liberal arts majors are more likely to change professions than other majors, except for in office and administration jobs.

Figure A3.2.
Between their first and their third jobs, liberal arts graduates transition into middle- and high-skill careers with high concentrations of college-educated workers.
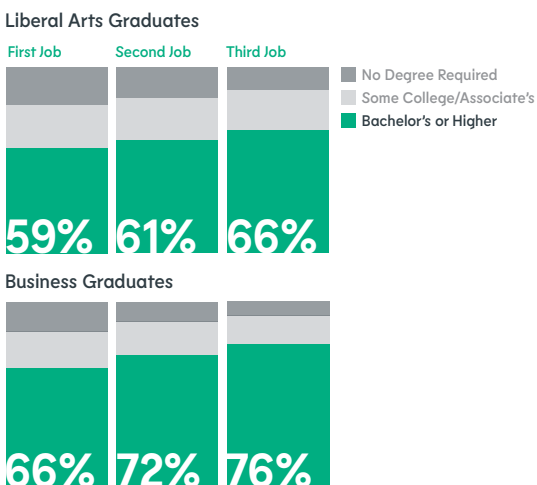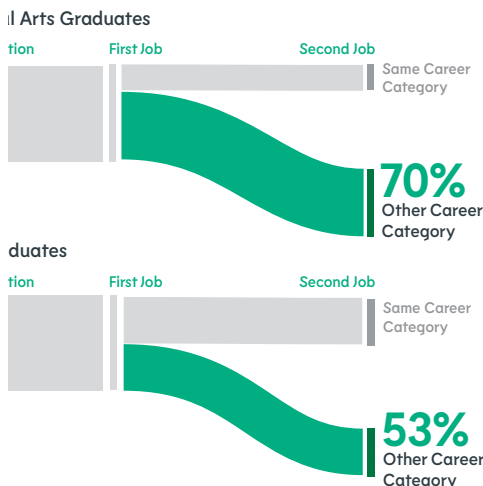
Figure A3.3.
Liberal arts graduates have high rates of career mobility: 70 percent change careers from their first job to their second job.

Liberal Arts Graduates

First Job | Second Job | Third Job
No Degree Required
Some College/Associate's
Bachelor's or Higher

59% 61% 66%

Business Graduates

66% 72% 76%

l Arts Graduates
tion | First Job | Second Job
Same Career Category
70% Other Career Category

duates
tion | First Job | Second Job
Same Career Category
53% Other Career Category

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Notes

Strada Institute for the Future of Work is dedicated to advancing our understanding of the future of learning and work, so that we may begin to build the learning ecosystem of the future. Strada Institute is a part of Strada Education Network®, a national nonprofit dedicated to improving lives by catalyzing more direct and promising pathways between education and employment.

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Emsi is a labor market analytics firm that integrates data from a wide variety of sources to serve professionals in higher education, economic development, workforce development, talent acquisition, and site selection. Emsi helps them align programs with regional needs, equip students with career visions, understand regional economic and workforce activity, and find and hire the talent they need.

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