# Exploring America's Tech Skills Gap and the Parallel Deficits of Applied Tech Skills and Hard Tech Skills

## RESEACH BY THE CAREER ADVISORY BOARD

*Presented by DeVry University*

The technology skills gap is a well-known issue in American education and employment circles. And yet, research tends to focus on only one aspect of the problem – the shortage of hard tech skills. According to code.org, a non-profit dedicated to expanding access to computer science, there are currently more than 500,000[1] open computing jobs nationwide, but fewer than 43,000[2] computer science students graduated into the workforce last year. Last year, the White House claimed that the federal government alone needed an additional 10,000 IT and cybersecurity professionals. These are just two examples in a mountain of statistics supporting the idea that when it comes to hard tech skills, the U.S. is not where it needs to be.

But there is another, perhaps even more critical dimension to the technology skills gap: the lack of applied tech skills in the workplace. When an individual has applied tech skills, he or she has the ability to integrate people, processes, data, and devices to effectively inform business strategy and plan for and react to unanticipated shifts in direction. In other words, those with applied tech skills understand how to use technology for the benefit of an organization, but they don't necessarily deploy specific technologies themselves. For the most part, that is left to the information technology professionals in possession of hard skills such as coding, data architecture development, and network security management.

### Definition of applied tech skills and definition of hard tech skills.

In studying skills gaps via our annual Job Preparedness Indicator study, the Career Advisory Board uncovered a lack of clarity around the specific technology skills that were lacking, and in whom. For our Technology Skills Gap research, we asked 500 hiring managers, human resource professionals, and c-suite executives to reflect on the importance of both applied tech skills and hard tech skills, the challenges they face in recruiting and retaining tech-savvy talent, and the degree to which educational institutions have been successful in preparing students with the right level of technical competency.

## General Skill Deficits Permeate All Employment

Our respondents reported dissatisfaction with the skills of both applicants and current employees – three in four employers (71 percent) agreed that it is rare for a hired employee to possess all requirements outlined in a job description.

Inadequate preparation by educational institutions continually comes up in Career Advisory Board research as a driving factor behind skills gaps. Sixty-two percent of our respondents said that students coming out of school are not prepared for jobs in their organizations, and just 11 said that school is very effective in meeting skill needs.

Respondents that felt strongly about the lack of preparation they're seeing from students elaborated further, noting that students "don't know how to apply what they learned to the day-to-day performance of a job."

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[1] The original source for this statistic is The Conference Board's Help Wanted OnLine® Service. The survey data is not accessible online.
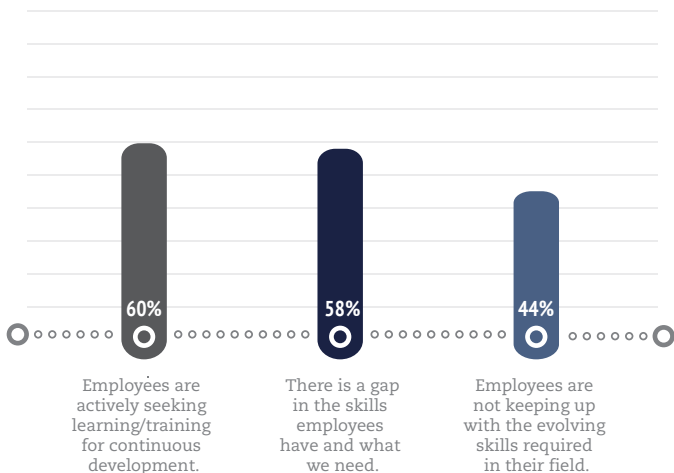[2] The original source for this statistic is the National Center for Education Statistics (NCES) IPEDS Completions Survey, obtained using the National Science Foundation (NSF) WebCASPAR tool: https://ncsesdata.nsf.gov/webcaspar/index.jsp?subHeader=WebCASPARHome.

Once on the job, the gaps don't close. Almost half of respondents (44 percent) said that current employees are not keeping up with evolving skills required in their field, and only 15 percent strongly agreed that their employees are actively seeking out training. Many employers place the responsibility squarely on the shoulders of their people. Respondents cited personal factors like motivation (30 percent) and time (20 percent) as the biggest barriers stopping employees from further developing their skills, rather than situational factors like cost or availability within the organization.

Although gaps are present in all skill areas, nearly 60 percent of respondents said it was common for applicants to lack technology skills important for success, and nearly half reported a technology skills deficit in their current employee base. In order to better understand the gaps here, let's get to the bottom of exactly what our respondents meant by technology skills.

## How much do you agree with the following statements about current employees in your organization?



| 60% | 58% | 44% |
| Employees are actively seeking learning/training for continuous development. | There is a gap in the skills employees have and what we need. | Employees are not keeping up with the evolving skills required in their field. |

# Applied Tech Skills Are Essential in 21st Century Business

Our employer respondents indicated significant pressure to keep up with the pace of technology and its ability to inform and impact business strategy. Technology is increasingly important to companies in all areas of business, with four in five respondents (79 percent) agreeing that for technology to be

effective, it must e people, processes, data and devices. Interestingly, 87 percent of baby boomer respondents supported this overarching view of technology, more than their younger counterparts in Gen X (76 percent) and the millennial generation (76 percent).

Seventy-seven percent of all respondents said a company's competitive advantage lies in using technology to solve problems, and they desire a workforce that is well-schooled in how to do this. Seventy-five percent agreed that employees should understand how to use technology to inform and drive business decisions, while 84 percent claimed that employees who know how to use the right tech tools in their fields are more effective.
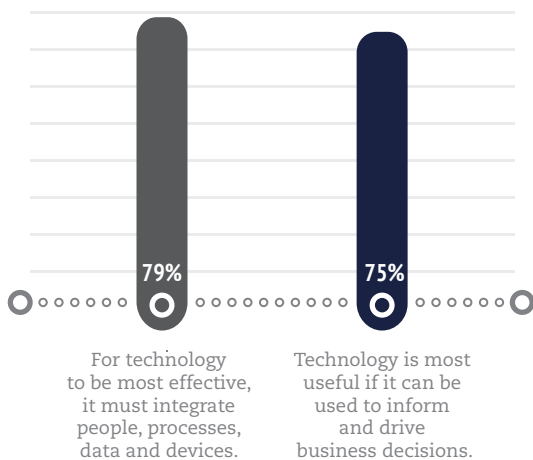
Furthermore, over 80 percent reported that companies that integrate data and processes are more successful, and 74 percent said that employees need to master the skill of integrating data and information from various sources in the service of better business decisions. According to the survey, the ability and willingness of employees to fully leverage data varies by age.

While 72 percent of respondents agreed that millennials are keeping pace with technology, only half said that baby boomers are.
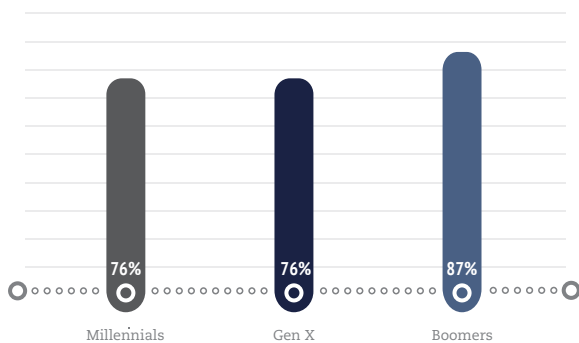
Data analytics, which refers to qualitative and quantitative techniques and processes used to derive business insights from behavioral data and patterns, is an example of an applied tech skill that is increasingly sought-after in all types of employee roles. According to the Society for Human Resource Management and the American Statistical

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Association's [2016 Jobs of the Future: Data Analysis Skills report](#)[3], 59 percent of organizations expect to increase the number of positions requiring data analysis skills over the next five years. The most common functional areas for data analysis positions are accounting and finance (71 percent), human resources (54 percent), and business and administration (50 percent). Seventy-eight percent of organizations who had hired for data analysis positions in the last 12 months reported difficulty recruiting for these positions.

The HR data analyst in particular uses the vast store of information and computing power within her organization to answer essential questions about her workplace and workforce. These questions might include: what part of a multi-million dollar training program drives the highest productivity? Which factors predict turnover? How should managers choose the right people to lead mission-critical assignments? An HR data analyst resides within HR, however, not IT, and where can we find such a person? It's not easy. Indeed, 88 percent of this survey's respondents said that it is important to address the data analytics skills gap in their organizations.



79% For technology to be most effective, it must integrate people, processes, data and devices.

75% Technology is most useful if it can be used to inform and drive business decisions.

## For technology to be most effective, it must integrate people, processes, data and devices.



76% Millennials

76% Gen X

87% Boomers

## Hard Tech Skills Are More Relevant for Certain Professions

Our study found that hard tech skills, while necessary for technology-specific roles, are not as universally required for American professionals. For instance, relevant work experience was cited as most important for organizations when it comes to job preparedness, outperforming technical certifications and STEM education.
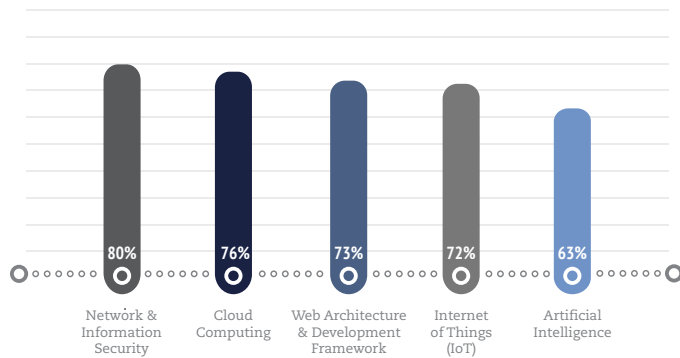
Meanwhile, 72 percent of respondents who work in the IT industry agreed that software skills are important for job success, compared with 49 percent of those in other industries like consumer services. And when asked what would make graduating students more prepared for jobs in their organizations, only 26 percent of all respondents said requiring testing of common computer programs, only 19 percent said requiring the ability to understand programming languages and interact with large data sets, and only 12 percent said requiring all students to learn to code.

However, just because hard tech skills like coding aren't mandatory for all job types doesn't mean that we aren't experiencing a serious shortage of these skills in IT-related professions where they are essential. For example, an overwhelming majority of respondents agreed that their organizations do not have enough of these hard tech skills: network and information security (80 percent); cloud computing (76 percent); web architecture development (73 percent); internet of things (72 percent); and artificial intelligence (63 percent).

Our results showed that if employees can develop these skills, organizations aren't as picky about how they do so. For nearly all of the hard tech skills in the previous paragraph, by a margin of greater than two-to-one, respondents said it is more important to prove skill knowledge and solve problems on the job than to have a physical credential from an accredited institution. This refreshing attitude opens the door for employees trained in other disciplines to master hard tech skills that will narrow the gap in their organizations.

[3] The original source for the data is the Society for Human Resource Management ["Jobs of the Future: Data Analysis Skills" Report.](#) (See Page 4)

Of the specific skills below, how important do you feel it is that each of these skill gaps are addressed at your organization?



| Network & Information Security | Cloud Computing | Web Architecture & Development Framework | Internet of Things (IoT) | Artificial Intelligence |
|---|---|---|---|---|
| 80% | 76% | 73% | 72% | 63% |

## Leveraging Educational and Employer Partnerships to Narrow Applied and Hard Tech Skills Gaps

Based on our collective years of expertise studying workplaces in both the public and private sectors, the Career Advisory Board recommends the following strategies for narrowing tech skills gaps.

» **Consistently update curricula:** Regardless of the degree program, course curricula within educational institutions should be revisited every 1-3 years so the appropriate level of tech-savviness is incorporated and updates can be made as necessary. Partnering with companies via the formation of advisory boards and back-and-forth sharing of the most current knowledge and content will help schools stay apprised of what applied and hard tech skills are required in the marketplace.

» **Leverage design thinking:** Design thinking is a strategy for innovation, using creative processes to integrate the needs of people, the possibilities of technology, and the requirements for business success. Schools can use this approach to ensure that students are interacting with technology in their education as they will in the real world, on behalf of modern organizations.

» **Encourage tinkering:** Both within the school and employment settings, we can institutionalize technology learning and experimentation – that is, we can make solving a problem by building an application or answering a critical business question via data analytics part of a student's coursework or an employee's daily responsibilities. Documented progress, especially as it results in students/employees retraining to become applied tech-proficient, should be rewarded and publicized.

» **Build reciprocal mentorship channels:** Boomer and even some Gen X-er employees are often criticized for their inability to adapt quickly enough to the technology that's driving their workplaces. Because they have been raised with devices in their hands, many millennials (and incoming Gen Z-ers) have a better handle on how to leverage technology to solve business problems. Reciprocal mentorship programs, which pair more seasoned employees with less experienced ones, can expand the application of applied tech skills throughout organizations while helping to ensure that young professionals get the development they need in other skill areas.

» **Focus on the female pipeline:** On a certain level, the tech skills gap doesn't make sense. Why not fill it with women, who are 50 percent of the population, yet are massively underrepresented in the IT industry? The public and private sectors must partner to establish hard tech skills development programs that target girls at very young ages, and keep supporting them with mentorship and resources as they progress through school and advance in their careers.

» **Review what's working elsewhere:** The technology skills gap is not unique to the US, but other nations in our increasingly intertwined global economies have taken steps we'd be wise to emulate. For example, Singapore's SkillsFuture initiative is laser focused on changing the mindset around continuous reskilling. Employers identify industry changes expected in the coming years, as well as the employee skills required to compete successfully. Using this information, SkillsFuture creates industry transformation maps designed to provide individual careerists with training direction, and also offers every citizen a financial subsidy to pay for courses from universities and MOOC providers.

## About the Tech Skills Gap Survey

The 2017 Tech Skills gap research was conducted online within the United States by DeVry University on behalf of the Career Advisory Board in January 2017. Survey respondents included 501 US-based individuals (64 percent male, 36 percent female), employed full-time in the roles of hiring managers, human resource professionals, and c-suite executives. Over 90 percent of respondents work at organizations with more than 500 employees, and two-thirds are in the healthcare, information technology, financial services, consumer services, and retail industries.

## About the Career Advisory Board

Established in 2010 by DeVry University, the Career Advisory Board is comprised of leading representatives from business and academia who deliver valuable insights on today's most important career trends and provide actionable advice for job seekers. The Career Advisory Board generates original research and commentary, and creates tools, insights and resources to prepare job seekers for success. Its members include executives from DeVry University, Google, Apple, HP, IBM, and LinkedIn, as well as nationally recognized career experts. For more information, visit CareerAdvisoryBoard.org

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