



WORKFORCE DEVELOPMENT IN THE AGE OF DIGITAL

Foreword

The tale of the U.S. job market is one of contradiction. An increasing number of jobs are being lost to intelligent automation, but the underlying digital technologies in use are also creating new roles that are going unfilled due to a severe skills shortage.

The technology skills of the past mostly centered on programming, which was easily executed by STEM talent. With digital skills evolving faster and becoming more pervasive in the world of business, talent from a variety of disciplines with capabilities honed in corporate ‘finishing schools’ must now be prepared for these jobs of the future.

A new approach to workforce development is needed, which is why Infosys has developed and scaled a program in the United States to address this shortage—training talent from a variety of backgrounds and disciplines from across the country for a more digital future.

Our model for workforce development recognizes private enterprise must play the lead role in embracing workforce transformation to solve the talent crisis. With technology roles growing exponentially within companies, it is unrealistic to look to fill all these open positions with graduates with 4-year degrees. These jobs can be performed by non-degree holding workers with the right specialized skills that can be nurtured through alternative education paths. To do so, we must recruit and train people with the ability to learn quickly and apply that learning to newly developed skills and digital approaches. Although

technical skills such as coding and data science are important, soft skills (including a strong work ethic, self-motivation, and social, emotional, and leadership skills) and holistic skills (like problem-finding) are the key components for success in today’s economy. This is obviously not predicated on the discipline in which one graduates, but on one’s ability to learn and continuously operate with a fluid, flexible set of contemporary skills that are constantly improving, on the job.

This means the linear, education-to-employment equation must give way to the continuum of lifelong learning. This is the only surefire way to guarantee workers stay on the cutting edge of all that’s needed for the future. That is why Infosys has created on-demand learning for employees, delivered through experiential means, which they can access throughout their time with the company. By substantially and continuously investing in the training of our people, we are not only removing barriers which would otherwise have prevented them from fully participating in the modern economy, we are also ensuring that our workforce remains at the forefront of all that’s relevant for the future.

And that future is exciting. With the proper background and skills, American workers can become even greater problem-finders and creative problem-framers by utilizing machines to be their efficient problem-solving partners. At Infosys, we have moved toward employing a mixture of full-time employees, gig workers, and software-led intelligence. While the gig talent pool flexibly scales human enterprise

whenever required, the software-led intelligence provides the insights and analytics that guide people in their pursuit of problem-finding and the automation to create bandwidth for their creative work.

Today, with the support of our academic, government, and business partners, Infosys has created a model for workforce development in the United States that is both scalable and relevant to companies in every industry. This model also includes the propagation of computer science as a foundational skill to be taught in American public schools—an agenda driven by Infosys Foundation USA. That is why I am pleased to share this report, which incorporates both quantitative and qualitative research to explain and demonstrate the value of such an approach. The lessons we have learned will serve others well too.

The United States, and the global economy, are at a crossroads. There is a gap between the skills businesses require and the skills workers possess, and there is an important role for businesses to play in overcoming that challenge. Businesses must step into the divide and create pathways for workers across the talent spectrum to learn, train, and succeed. By preparing the workforce of today for the challenges that lie ahead, we can seize the opportunities the digital economy presents us and unleash a new age of innovation and prosperity.

Ravi Kumar S.
President, Infosys

Executive Summary

There are more science, technology, engineering, and mathematics (STEM) jobs in the United States than there are qualified people to fill them. Last year, 2.4 million STEM jobs remained unfilled¹—a figure larger than the population of Houston, the nation’s fourth-largest city.² The gap is so wide and well-known that two out of five Americans describe the situation as “a crisis.”³

The gap exists—and persists—due to a fundamental misalignment between academic institutions and businesses. The economy for which colleges and universities have prepared their graduates is not the economy in which businesses operate. In today’s digital age, businesses increasingly need workers who are fluent in digital skills, capable communicators, well-versed in logical and analytical reasoning, and geared toward problem-finding rather than just problem-solving.

FEEDBACK THAT SCHOOL ADMINISTRATORS RECEIVED FROM EMPLOYERS

28%

say graduating students lack the necessary communication skills

VS.

11%

say graduating students lack the necessary digital or technical skills

This misalignment threatens to leave businesses incapable of filling high-value roles, and it means the U.S. economy misses out on ideas, services, products, innovation, and of course, growth. The Bureau of Labor Statistics forecasts the number of STEM-related jobs in America will grow steadily until 2024 (they did not forecast any further),⁴ likely enlarging this gap between job openings and capable candidates.

STEM jobs have

DOUBLED

as a proportion of all jobs worldwide since the Industrial Revolution.

Source: The Smithsonian Science Education Center

Most discussions on how to close this gap arrive at similar solutions: more students need to study STEM subjects at all grade levels; more schools and universities need to provide STEM courses; and the federal government should encourage skills-based STEM programs in schools and in the workforce.

These are crucial steps, but each—and all—would likely take years to implement. And perhaps more importantly, this discussion misses the larger point. While there is a great need for more STEM talent, what businesses truly need is more STEM-capable talent—workers who have the aptitude to learn digital skills and continue to evolve that skillset

throughout their careers. The digital economy will not allow for workers to make a career out of expertise in one area alone. Rather, workers must be prepared to adapt to the constantly changing skill needs of the modern economy.

This is why it is so concerning that the private sector has been noticeably absent from the conversation. The private sector, which has the resources—and incentive—to prepare today’s workers and graduates to fill today’s vacancies and develop the skills for tomorrow’s challenges, must play a larger role in creating a workforce capable of performing in-demand skills. Companies are uniquely positioned to help workers clear the two most common hurdles to attain the training they need: lack of time and lack of money.

75%+

of U.S. workers and hiring managers believe corporations must play a greater role in developing “unconventional” candidates.

Source: Infosys Research on Workforce Development in the Age of Digital

This paper explores how Infosys is building a highly skilled local workforce at scale and at speed and doing so in an environment where such skills were—and still are—in measurably short supply. It is doing so by investing in cities outside of Silicon Valley, which are not traditionally considered to be hubs for tech talent, including Indianapolis, Hartford, and Richardson, Texas.

The centerpiece of this report is Infosys' ongoing U.S. Talent Program: a commitment of \$20,000 and up to twelve weeks of full-time training for each American worker the company hires from schools, with no strings attached.

Underpinning this initiative is a recognition that technical skills can be taught to STEM and non-STEM workers alike—and the private sector is well-placed to do the teaching, especially to local talent with the aptitude to be trained in the broad-based skills necessary in today's and tomorrow's economy. By broadening the aperture through which Infosys views candidates and hires new workers, the company is expanding the pool of potential talent. This approach has helped Infosys hire more than 7,600 American workers so far, and by the end of 2019, that figure is on pace to meet 10,000.

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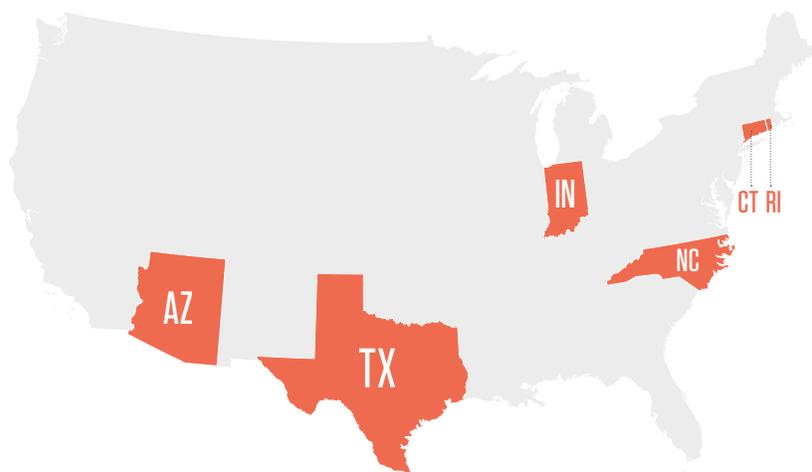
Technology and Innovation centers

10,000

American workers hired by 2020

\$20K

spent on training each new employee from schools



Infosys' investment in people has been accompanied by its investment in communities. The company has committed to establish and open six Technology and Innovation Centers in the United States by 2020, including Centers in Raleigh, North Carolina; Phoenix, Arizona; and Providence, Rhode Island, in addition to the three cities listed previously. In these cities, Infosys is not only building Centers, but also talent pipelines, and is partnering with universities and community colleges to provide students with training, graduates with opportunity, and Infosys employees with the reskilling necessary to stay on the cutting-edge of innovation.

Infosys' experience has shown that while the skills issue is resistant to simplistic solutions, it is not insurmountable. By providing opportunities, training, and financial support, Infosys has seen people from across the country perform brilliantly in highly technical, highly skilled roles—roles for which they might have been deemed unqualified had only their diplomas or résumés been evaluated.

This paper shares Infosys' experience, the data which informed this initiative, and reflections from those involved to show how companies can be part of the solution to today's skills crisis—and be stronger for the effort.

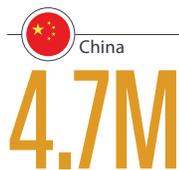
The Skills Gap

Challenges faced by students and workers

A Shortage of Students—And Capacity

The number of American STEM graduates—568,000 in 2016—in no way approximates the country’s current STEM-related job openings. The U.S. needs to encourage more students to study STEM, especially women and minorities. But as the number of STEM students gradually rises, so too will the number of STEM-related employment opportunities (and very likely, vacancies), making it all the more necessary to nurture and train STEM-capable talent in the technical skills the digital economy requires.

GRADUATED WITH STEM DEGREES IN 2016



Source: World Economic Forum, “Human Capital Report”

A push to attract more students needs to be accompanied by a move to create more courses, hire more professors, and create more capacity. A 2019 report in *The New York Times* described undergraduates’ struggles to secure placement in STEM courses at U.S. universities, with some colleges holding lotteries for computer science courses while others wait-list hundreds of students for such classes.⁵ Increased investment from universities into STEM courses and professors would help to alleviate, but not solve for, the gap that exists—a gap that will remain without private sector intervention.

SINCE 2015

134,000

Students

2,500

Teachers

2,500

Schools

across America have benefited from computer science training and classroom equipment funded by Infosys Foundation USA

Barriers Faced by Many Workers: Time and Money

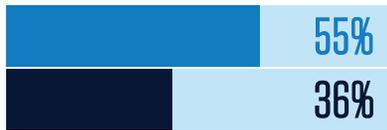
Viewed through the lens of STEM skills, workers can be divided into two broad categories: those with them and those without. Those with STEM skills are considered “conventional” talent—they have the background, the training, and the experience that jobs in the field have long prized and required. Those without this education and experience are referred to as “unconventional.”

Both kinds of talent have a role to play in closing the STEM skills gap. According to a 2018 report by Pew Research Center, almost half of workers with college STEM training are working in a non-STEM job (like business or finance).⁶ Clearly more can be done to attract and retain conventional talent.

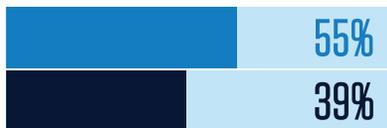
If “unconventional” workers are to help bridge this STEM gap, they first need to acquire STEM skills. Research commissioned by Infosys asked workers without STEM degrees to cite the biggest barriers to the pursuit of STEM credentialing opportunities. More than half (55%) said it was the “cost of the program,” while 50% pointed to the “time needed to dedicate to the program.” Thus, Infosys’ initiative to pay motivated, capable workers a salary while they learn high-tech skills for up to 12 weeks removes the two most common barriers to doing so.

BARRIERS TO TRAINING

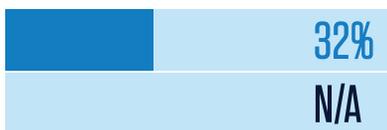
COST OF PROGRAM



TIME NEEDED TO DEDICATE TO PROGRAM



UNABLE TO BALANCE PROGRAM WITH WORK RESPONSIBILITIES

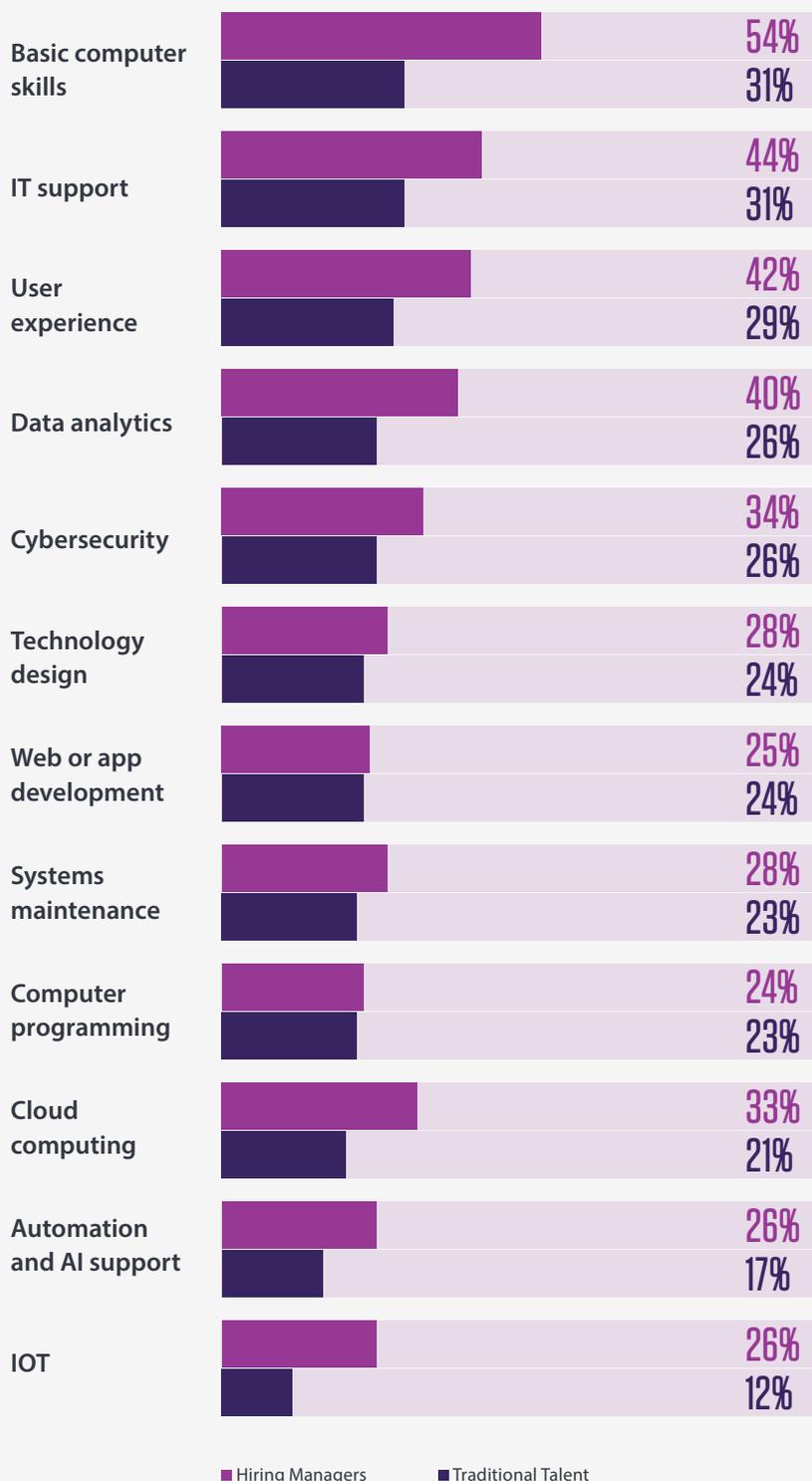


■ Unconventional Talent ■ Traditional Talent

Plenty of Training—But Quality and Consistency in Short Supply

Yet training clearly isn't the only answer to addressing today's skills shortage, as most American workers already receive it in some form. At its most effective, training teaches high-demand, cutting-edge skills, yet many corporate training programs teach only rudimentary ones. Research by Infosys found that only half of U.S. hiring managers (54%) said their company offered training in basic computer skills, and only one in three said their company offered more specialized training in cybersecurity (34%) or cloud computing (33%).

AVAILABILITY OF DIGITAL AND TECHNICAL TRAINING IN THE WORKPLACE



THE MEDIAN INVESTMENT FOR
EMPLOYEE TRAINING IN THE U.S.
IS \$1,000 PER EMPLOYEE,

1/20TH

of Infosys' commitment.

Source: Infosys research on Workforce
Development in the Age of Digital

Content matters, but so does the consistency with which it is delivered and updated. As technology changes continuously, so do the skills required to use it and the problems that it can solve (and create). Likewise, content must also be tailored to the recipient. Those solving for digital challenges from a systems-level perspective need to hone a different set of capabilities than those developing and refining emerging technologies. While all workers need a basic digital fluency, variations in worker responsibilities require variable training regimens in specialized functions—training which must continue and evolve over time in response to technological disruption. These disruptions are happening more quickly than ever before, rendering skills, degrees, and certifications in many STEM fields obsolete, or at the very least outdated, at a surprising rate.

This problem is by no means unique to the American workforce. According to a 2019 McKinsey report, 60 percent of global executives expect “up to half of their organization’s workforce will need retraining or replacing within five years.” Almost three in 10 executives “expect that more than half

of their workforce will need retraining or replacing,” while roughly that same number said their organization was unprepared to do so.⁷

The Infosys Initiative

Investing in people and communities and partnering with universities

The Infosys Commitment: \$20,000 and up to 12 Weeks of Training Per New Hire from Schools

In May 2017, Infosys launched its U.S. Talent Program from Indianapolis, committing to hire 10,000 American workers and establish six Technology and Innovation Centers across the country by 2020.

It was—and still is—a decision informed by business practicalities: Infosys’ business relies on a skilled, motivated, and creative workforce. Infosys needs employees on the ground, capable of working side-by-side with clients in the U.S., and building trusted relationships with them—providing the kind of on-site, tailored solutions which just aren’t possible with offshore teams.

“Yes, there is a cost to our U.S. Talent Program, but it’s well worth the investment. Our program allows us to attract top talent and deliver value to our clients.”

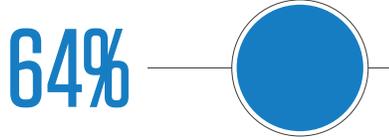
- Srikantan Moorthy, Executive Vice President, Global Head of Education, Training and Assessments, Infosys

It is also supported by research. A survey by Infosys found that “unconventional” talent identified time and money as the most common obstacles to STEM training—obstacles that also existed for 3 in 10 workers with conventional backgrounds. Infosys’ U.S. Talent Program makes a recruit’s aptitude, work ethic, and potential the determining factors, not their savings or degrees. Increasingly, clients’ problems are best solved by teams of local, diverse, creative thinkers who can quickly learn and absorb new skills, tackle complex problems, communicate well, and help solve problems that haven’t yet emerged.

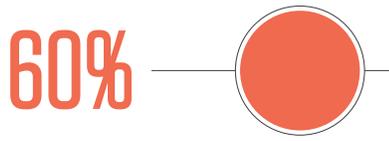
And finally, the decision was informed by the Infosys corporate culture. The brevity of the word “training” belies the amount of thought, investment, and commitment that is required to do it brilliantly. An ethos of lifelong learning has been central to Infosys’ business since its founding in 1981. Central to this ethos is the belief that the relationship between education and professional work is not linear. Infosys does not subscribe to the conventional view which holds that citizens learn first (in schools and colleges) and earn later (in their jobs)—as if to suggest that learning stops when earning begins. Too many of America’s universities and employers are still frozen in old ways, in which members of society study for their first 15 or 20 years, and then work for the rest of their lives. In the future, with the rapid evolution of technologies in the digital world, study and work will be a continuum.

RESOURCES TO OVERCOME BARRIERS

Online education courses to take at your convenience



Employer-subsidized costs for credential or certification programs



Webinar series on real-world examples of STEM careers



In-person training from employer to build necessary proficiency requirements



Information on salaries and opportunities for careers



“The larger legacy employers are accustomed to receiving students who come off the assembly line and then plugging them into their organization. But the model has changed. We have to figure out how we can have ‘earn-and-learn’ models.”

- Danny Lopez, Indiana Governor’s Workforce Cabinet, Chairman

That is why Infosys runs the world’s largest corporate education program from one of the world’s largest corporate universities in Mysore, India. There, the company can train 14,000 people on a single day, and Infosys leads a six-month program for every campus recruit in Mysore. Infosys is currently constructing a similar campus in Indianapolis—the Infosys U.S. Education Center—that will be the largest training center developed by any technology services provider in the country, and one open to recruits and clients alike. It’s this proven model of training and learning at scale that the company is bringing to the United States.

“The key for Infosys, what I believe differentiates us, is a culture and a philosophy of lifelong learning.”

- Ravi Kumar S, President, Infosys

Innovation Centers and Academic Partnerships

Along with the company’s announcement to hire 10,000 American workers, Infosys will open six Technology and Innovation Centers in the U.S. by 2020. The first Center opened in March 2018 in Indiana. Other Technology and Innovation Centers have been opened or are being built in North Carolina, Connecticut, Arizona, and Texas, as well as a Digital Design and Innovation Center in Rhode Island, each with its own unique focus on discrete digital capabilities. These Centers are not simply office

spaces for new employees. They are convening grounds for collaborative work with clients, allowing Infosys to develop agile solutions to clients’ challenges. They are training centers, bringing together Infosys’ top-tier educators to train and nurture the next generation of talent. These Centers collectively represent the physical manifestation of Infosys’ hiring and workforce development efforts and are integral to the company’s localization strategy.

These Centers also feature complementary sets of accompanying academic partnerships. In 2018 Infosys entered into a five-year partnership with one of Indiana’s largest colleges, Purdue University, with an aim to train many of the 3,000 hires Infosys will make in Indiana. By the end of 2020, when Infosys opens its U.S. Education Center, these partnerships will form integral components of Infosys’ overall training program—preparing students and graduates to be industry-ready.

Ensuring students are industry-ready is the same goal Infosys has for its partnerships with community colleges, such as Wake Tech in North Carolina and the Community College of Rhode Island. These partnerships seek to unlock the potential of community college students, recognizing that community college graduates possess the talent and aptitude to pursue careers in the digital economy. With more than one-third of all U.S. college students enrolled in community colleges,⁸ it is critical to the growth and success of the U.S. economy to deliver these students relevant skills

as well as meaningful, real-world learning experiences designed to prepare them for technology careers immediately upon graduation. Perhaps as important, these community colleges are delivering to the business community students who are prepared to learn and evolve throughout their careers. By pairing tangible, technical skills with the knowledge and capability to learn new skills over the course of a career, these partnerships are preparing a large and growing pool of potential talent for the realities of the modern economy.

“All institutions of higher education, including community colleges, have a fundamental obligation to provide students with the learning, skills, and experience they will require to secure their first job after graduation and continue to grow in a rapidly changing modern economy.”

- Dr. Meghan Hughes, President of Community College of Rhode Island

And just as Infosys has invested in “unconventional” talent, so too has it focused on hiring for highly technical roles from schools not traditionally thought of as producing STEM talent, such as the Rhode Island School of Design and Trinity College, a traditional liberal arts school in Connecticut. The skills and perspectives these design and liberal arts graduates bring to Infosys allow the company to more effectively create human-centric solutions to client challenges.

“Liberal arts students are a different, and maybe unconventional source of future employees for the technology industry, but they are doing a great job adapting to technological positions because: one, they know how to learn; two, they’ve learned some of those soft skills that allow them to work with all kinds of people; and three, they come in with very strong oral and written communications skills.”

- Dr. Joanne Berger-Sweeney, President of Trinity College

Training Snapshot: Anytime, Anywhere, Any Device

The tenure and topics of recruits’ training programs are tailored to their backgrounds and roles, but most receive an overview of core technologies as well as emerging ones, and later learn foundational skills in enterprise application development. Then, depending on the role for which a recruit has been hired, they branch off into one of 40+ specializations: a deep dive into user interfaces or applications, big data, or machine learning. It’s a continuously updated model which recruits can access anytime, anywhere, using any device.

Employees similarly enjoy readily available, specialized training. Last year, Infosys launched Wingspan, a training tool providing best-in-class, curated content from multiple sources that employees can access to enrich their knowledge. With machine

learning capabilities, Wingspan provides tailored and relevant learning recommendations, as well as guidance, to keep employees on the cutting-edge of innovation.

Infosys’ training programs with academic institutions also provide specialized learning opportunities. Through Infosys’ partnership with online university Udacity, for example, the company offers 10-week training programs on subjects ranging from user experience to Java, from testing to automation. The programs combine lectures and hands-on projects that teach trainees core, emerging, and methodology skills while simulating time-constrained, pressure-filled environments.

“We have a group of almost 600 educators in the company who are focused exclusively on providing education interventions to our employees. Their job is not only training people, but also creating new curriculum.”

- Srikantan Moorthy, Executive Vice President, Global Head of Education, Training and Assessments, Infosys

Closing

The alarm about a shortage of skilled talent has been sounded before in the U.S., and thanks to meaningful action, genuine past concerns can now be classified as successfully averted crises. In 1945, the Director of the Office of Scientific Research and Development prophesied the United States “will enter the postwar period with a serious deficit in our trained scientific personnel.” Less than a decade later, the president of MIT warned, “Our national welfare, our defense, our standard of living could all be jeopardized by the mismanagement of this supply and demand problem in the field of trained creative intelligence.”

Today, there is little doubt about the scale of the skills gap, its importance to the business community, or the effect on the national economy. The U.S. Department of Labor wrote that “STEM fields have become increasingly central to U.S. economic

competitiveness and growth.”⁹

The only real question is whether companies which are capable of helping to close this skills gap will do so. No one company, nor academic institution, nor government can do this alone. It will take a concerted effort among business, academia, and government, but, in Infosys’ view, it is an effort well worth making.

“We are now applying our experience of training a global workforce to help grow local, highly skilled workforces across the U.S.”

- Ravi Kumar S, President, Infosys

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