STEM connector
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State of STEM

Defining the Landscape to
Determine High-Impact Pathways
for the Future Workforce

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About this Report

State of STEM seeks to illustrate the current STEM landscape, including the organizations, systems, and forces that comprise and shape it in a comprehensive way that has not been done before. This report offers a detailed typology of STEM talent gaps and recommends areas of focus for practice and investment to address those gaps. It is a comprehensive, though not exhaustive, look across the ecosystem and issues surrounding STEM. This report is meant to provide a common language for those working in any sector that touches STEM, supporting those seeking to build connections across this complex system. *State of STEM* will serve as a framework for further exploration as well as action.

To produce this report, STEMconnector:

- Gathered the perspectives of 114 individuals through individual interviews, group interviews, and focus groups. All individuals interviewed touched the STEM ecosystem through a variety of functions – from executive leadership to frontline education. Individuals represent multi-national corporations, national nonprofits, local nonprofit organizations, academia, foundations, and other organizations and institutions.
- Interviewed undergraduate and graduate students in STEM programs.
- Reviewed literature across STEM and related fields, including education and youth development, workforce development, economic mobility, technology, innovation, equity, and other disciplines. Information on these sources is captured in the endnotes and in the callout boxes.
- Reviewed quantitative data through sources such as U.S. Bureau of Labor Statistics and National Center for Education Statistics.

Of note, *State of STEM* intentionally focuses on American talent challenges. However, we recognize the role that global macroeconomic and political forces play in the STEM landscape and the talent challenges that multinational companies face across the globe. Future research may explore talent challenges specific to other countries.

Executive Summary

Over the last 20 years, the perceived ‘gap in STEM-ready workers’ has been a focus area for employers, educators, job-seekers, students, and more. Despite this, there is still dissonance about the nature and scope of the STEM talent gap.

STEMconnector has set out to understand this lack of consensus, building on other foundational research, while laying out a new, comprehensive framework. We interviewed over 100 subject matter experts and practitioners from employers, research institutions, government, K-12 education, postsecondary education, and other sectors to capture the varying perspectives of these stakeholders across the STEM ecosystem. *State of STEM* illustrates the current STEM landscape including the organizations, systems, and influences that comprise and shape it. This report establishes a common language for those working in any sector that touches STEM and supports those seeking to build connections across this complex system.

While mapping the STEM ecosystem, we realized that there is no single STEM talent gap, but rather several layers of underlying challenges that produce what is usually perceived as a single gap. Specifically, we have uncovered five critical gaps in the STEM workforce and the overall workforce of the future.

1

Fundamental Skills Gap

Industry and education have identified skills that young people need to succeed as lifelong workers and active citizens, but not enough young people are developing that foundation.

2

Belief Gap

Young people, and adults around them, hold incorrect beliefs about the aptitude or traits young people must have to belong and thrive in STEM fields.

3

Postsecondary Education Gap

The new knowledge economy requires credentials beyond a high school diploma, but not enough young people are earning those credentials.

4

Geographic Gap

Hubs of economic growth, particularly for businesses requiring STEM skills, are often far from large concentrations of qualified job seekers or far from population centers.

5

Demographic Gap

There is disproportionate participation in STEM jobs based on race, gender, and income, despite decades of focus on diversity and inclusion.

The five STEM talent gaps we have identified interact with each other across the STEM ecosystem—K-12, postsecondary education, and employer—and are pressured by influences that sit outside the systems—technology, macroeconomy, policy, and media. This interaction creates an overall opportunity gap for individual students and job seekers, a workforce development challenge for educators, and a business imperative for employers. Closing these gaps will require more than simply creating or investing in a new program. It will require cross-sector coordination of practice, funding, and policymaking.

Several operating principles emerged based on our refined understanding of both the STEM ecosystem and the STEM talent gaps. Organizations need to think systematically, act in coordination and alignment, and adopt a human-centered design approach. The challenges we confront in readying a diverse workforce for the future are many, and they are complex. Any solution we seek must be guided by these principles, or we will continue to see isolated impact, not progress at scale.

There is no one solution that will create progress at scale, just as there is no one single talent gap. Based on our findings, we set out recommendations for action and investment, intended to either enhance practice within a system, or create a more enabling environment around those systems.

While the solution sets may appear simple, they must be deployed with a deep understanding of and appreciation for the complexity of the STEM talent ecosystem and the gaps that emerge within it. The solutions are meant to work together, just as the five STEM talent gaps work together to create the overall challenge we face. Any investment will see greater leverage with greater intention around the location and type of solution, and alignment with other efforts. While some solutions may be able to be deployed quickly, lasting progress requires time and a commitment to deep collaboration.

- Solution sets that seek to **enhance organizational and professional practice** emphasize the need for intentionality around the dose (quantity or intensity), frequency, duration, and standardization of these practices to allow them to reach their fullest expression and lead to the most positive outcomes. Some of these recommendations include: exposing young people to STEM routinely, equipping students and job seekers with navigation resources, and assessing skills and credential requirements.
- Solution sets that seek to **create an enabling environment** emphasize stronger connections, clear information flows, and more sustainable practice changes beyond a single profession, organization, or even system. Some of these recommendations include leveraging data at all both organizational and systemic levels, and aligning incentives for organizations and individuals with overall STEM ecosystem talent goals.

Upon establishing these recommendations for the field, STEMconnector will build on the research that produced this report to guide the content of our research, convenings, initiatives, and services. Our research and data will drive our decisions and be responsive to both member and market needs.

The *State of STEM* is both encouraging and challenging, full of potential and pitfalls, and calls us to move from awareness to action and, ultimately, impact.

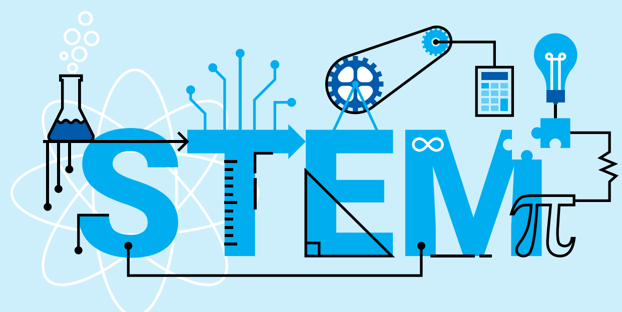
I.

Introduction

What is the State of the STEM Workforce?

Box 1

STEMconnector's definition of STEM



While we recognize that STEM stands for "Science, Technology, Engineering, and Math," we seek to expand our understanding of the definition beyond the acronym to include the set of knowledge, skills, and mindsets that all students and workers need to succeed in both middle- and high-skill jobs in the modern economy.

America is facing a workforce crisis with implications for economic competitiveness and national defense. Businesses struggle to fill critical skilled roles in STEM occupations and thus suffer sluggish growth. In fact, some estimate up to 2.4 million STEM jobs go unfilled.[1] College graduates in STEM fields struggle to find jobs. Those without a postsecondary degree can barely achieve a family sustaining wage. Technology and automation are rendering human workers obsolete across industries.[2]

America is also on the cusp of a revolution in work, with technology fueling innovation and opportunity beyond our imaginations. STEM jobs have doubled as a proportion of all jobs since the industrial revolution. New jobs and entirely new fields are being created daily. Estimates suggest that 65 percent of children entering elementary school today will ultimately end up working in completely new job types that are not on our radar yet.[3] Job seekers have more choice than ever before, and advanced skillsets are in demand. More students are in college than ever before, and STEM graduates out-earn those in non-STEM fields 12-30 percent across all education levels.[4]

It seems impossible for both these narratives to be accurate. Yet, impossibly, they are both quite real.[5] These two realities demand a greater understanding of the STEM talent ecosystem and a greater commitment to action.

Both employers who have jobs to fill and job seekers are facing myriad confusing messages, options, and challenges. Considering this complexity, it is tempting to put our energy towards finding a single solution — the one program, metric, or organization that has all the answers. Since the National Science Foundation (NSF) coined the term "STEM" nearly two decades ago, we have seen an explosion in interest, investment, programs, research, and data all seeking such a solution. The field is asking questions in pursuit of this solution such as:

What letter should be added to the STEM acronym?

Which jobs "count" as STEM jobs?

How many jobs will robots take from humans?

How big is the STEM talent gap?

> ***"Why define a target that's always moving? Let's not spend our time defining STEM, but rather spend it collaborating and taking action that gets us to the goal we share: a more robust STEM workforce."***
>
> **Justina Nixon-Saintil**
> *Director*
> *Corporate Social Responsibility*
> Verizon Foundation

> ***"Creating an adaptable, STEMready workforce requires full participation not just of the student or job seeker, but of all those who influence their outcomes, including educators, employers, families, non-profits, and funders. Success requires an intentional and collaborative approach."***
>
> **Drew Glassford**
> *Director, Strategic Initiatives*
> Boy Scouts of America

These questions, which may seem reasonable, have not addressed the systemic challenges. Seeking answers to these questions has led us to build systems of incentives, practice, and narrative over time that interact to create the outcomes we now see—outcomes that do not serve anyone well or fully.

These questions serve as a distraction for companies, funders, educators, policymakers, students, and job seekers. They distract from the questions that, if pursued, could lead to real transformation for business and for society. Many of the current questions—particularly those seeking to name skills or number of jobs—are also "probably unanswerable."[6]

These questions also isolate and divide at a time when we need all sectors and systems working together in coordination, focused on closing talent gaps. That daunting yet essential work is about recognizing that every student, every job seeker must be equipped with the set of knowledge, skills, and mindsets we associate with STEM.

Asking different questions will lead us from incremental progress to impact at scale, creating economic value and social impact.

What skills do we need to build in all students, so they are ready for today's careers and prepared to adapt for those of the future?

How can we create more connected and relevant pathways through learning and working?

How can we move from discussion of diversity, equity, and inclusion in the STEM workforce to tangible results?

How can we better align sectors, respecting separate objectives while working toward common goals?

These questions embrace the complexity of the modern workforce and the STEM talent ecosystem. STEMconnector seeks to use this report as a framework to create discussion and catalyze action around these questions.

"Why now?" you may ask. Haven't we written enough about this topic already?

We have reached a moment in time where STEM is not set apart from the world, but rather influences every aspect of our education, work, and community life. There were no touchscreen phones in the room nearly two decades ago as the NSF met and created the term "STEM." The public education system did not serve nearly the diversity of students it does today. The pace of change in technology has accelerated, and we have seen more progress over the last five years on automation and Artificial Intelligence (AI) than in the previous 50.[7]

Individuals, organizations, and systems surrounding STEM must move into this new reality to solve today's challenges and embrace tomorrow's opportunities.

> ***"The future competitiveness of the United States in an increasingly interconnected global economy depends on the nation fostering a workforce with strong capabilities and skills in STEM."*** [8]
>
> The National Academy of Sciences

> ***STEM is about creating opportunity for businesses and for individuals to drive the innovation that will transform the world."***
>
> **Balaji Ganapathy**
> *Head of HR Workforce Effectiveness*
> Tata Consultancy Services

In Section II, we describe the STEM ecosystem and reveal the complexity of relationships within and across sectors. This allows us, in Section III, to more fully interpret the challenges and disconnections in education and work and to reconsider the real drivers and gaps. Section IV lays out a framework for action and proposes pragmatic and effective solutions that inform organizational practice and investment.

Box 2

Key readings on the future of work

1. **A future that works: Automation, employment, and productivity.** James Manyika, Michael Chui, Medhi Miremadi, Jacques Bughin, Katy George, Paul Willmott, and Martin Dewhurst. McKinsey & Company.

2. **Digitalization and the American Workforce.** Sifan Liu, Siddharth Kulkarni, Mark Muro, and Jacob Whiton. Brookings Institution.

3. **The Future of Jobs and Jobs Training.** Janna Anderson and Lee Rainie. Pew Research Center.

4. **Navigating the future of work: Can we point business, workers, and social institutions in the same direction?** Josh Bersin, John Hagel, and Jeff Schwartz. Deloitte.

5. **How Technology Is Destroying Jobs.** David Rotman. MIT Technology Review.

6. **The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution.** World Economic Forum.

Box 3

Key sources of STEM data

Data is a challenge in this topic area. As the STEM talent gap is about education, work, economy, technology, and more, we must use a variety of sources to speak to those different elements of the STEM challenge when describing the STEM ecosystem.

1. **National Science Foundation (NSF):** The NSF supports research and education in science and engineering, and their National Science Board produces the annual Science & Engineering Indicators dashboard.

2. **Burning Glass:** With its artificial intelligence technology, Burning Glass analyzes hundreds of millions of job postings and real-life career transitions in order to provide insight into labor market patterns.

3. **U.S. Bureau of Labor Statistics (BLS):** As part of the U.S. Department of Labor, the BLS is the principal federal agency responsible for measuring labor market activity, working conditions, and price changes in the economy.

4. **National Center for Education Statistics (NCES):** The NCES collects and analyzes education data from pre-kindergarten through postsecondary education, including STEM-related disciplines.

5. **Pew Research Center:** The Pew Research Center polls students and employees along the STEM talent pipeline, measuring interest and retention in STEM fields as well as barriers present along the pipeline that may deter people from pursuing STEM careers, namely pay inequity and a lack of diversity.

6. **Gallup, Inc.:** Gallup conducts an annual student survey capturing student goals, engagement, and other variables, with nearly five million completes since its inception in 2009.

II.

The STEM Ecosystem

The STEM ecosystem is the set of systems, organizations, individuals, and forces that shape the experience and outcomes of those who interact with them. The first step in unpacking the complexity of the STEM ecosystem is to define its major subsystems and their elements, connections, and functions.

> ***"We believe it's critical to understand and catalyze action in state-level systems in order to achieve greater impact in the STEM talent space."***
>
> **The Honorable Regina B. Schofield**
>
> *Director, Corporate Engagement & Education*
>
> Battelle

This section of this report is descriptive, and the implications of this current landscape will be explored in Sections III and IV. Any given map can be applied at a hyper local level (a single community) or a national level. All of them take a human-centered design approach, which means that each sub-system map puts a person—a K-12 student, a postsecondary student, or an employee—at the center. The most proximate actors to the student or employee are the most influential in his or her pathway.

This set of system maps is designed as a defined starting point, though we will continue to build them out in greater detail across 2018 using a digital platform. This online, interactive platform will allow our members to access greater detail on each element of the system, providing a valuable tool to guide investments. Understanding this system in greater detail reveals how prospective solutions fit into the whole, producing more systemic and less isolated progress.

Figure 1 is a base map of the STEM ecosystem, including three main sub-systems, also known as sectors. Within each sector are different organizations and individuals who influence the overall outcome.

K-12

Refers to education from early childhood through high school graduation.

Postsecondary

Refers to all educational experiences beyond secondary or high school.

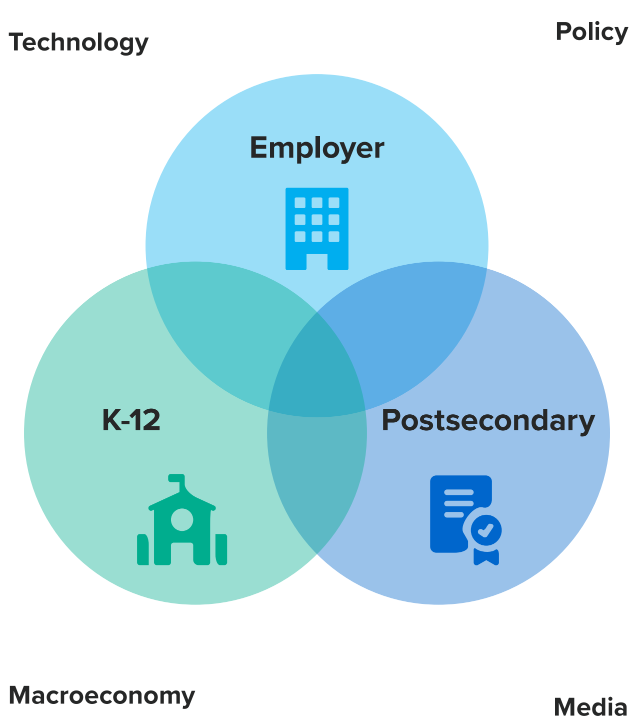
Employer

Refers to the organizations that provide jobs, including those in the private sector (i.e., corporations) and the public sector (i.e., government).

Figure 1 also lists forces or influences that place pressure on the sub-systems by producing embedded incentives, guidelines, and beliefs. These forces include:

Figure 1.

STEM Ecosystem Base Map



Technology

Includes both personal and organizational technologies. Over 70 percent of Fortune 500 CEOs reported that keeping up with rapidly changing technology is their number one challenge.[9]

Macroeconomy

Includes consumption, trade, immigration, unemployment, monetary policy, and others.

Policy

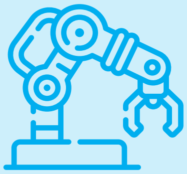
Includes legislative or administrative bodies and actions at the local, state, and national levels.

Media

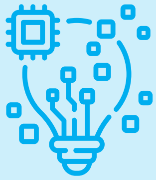
Includes digital media such as social media, as well as traditional press.

Box 4

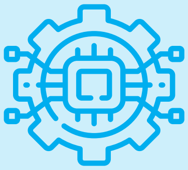
Three technology trends influencing the STEM workforce



1. **Automation:** robots, computers, or other technologies performing physical or cognitive work activities often previously conducted by humans.[10]



2. **Digitalization or digitization:** the diffusion and use of digital technologies and information into nearly every business across operations, assets, and worker activity. It can be considered a form of automation.[11]



3. **Artificial intelligence:** technology that appears to emulate human performance or intelligence by learning, appearing to understand complex content, and performing routine and non-routine tasks.[12]

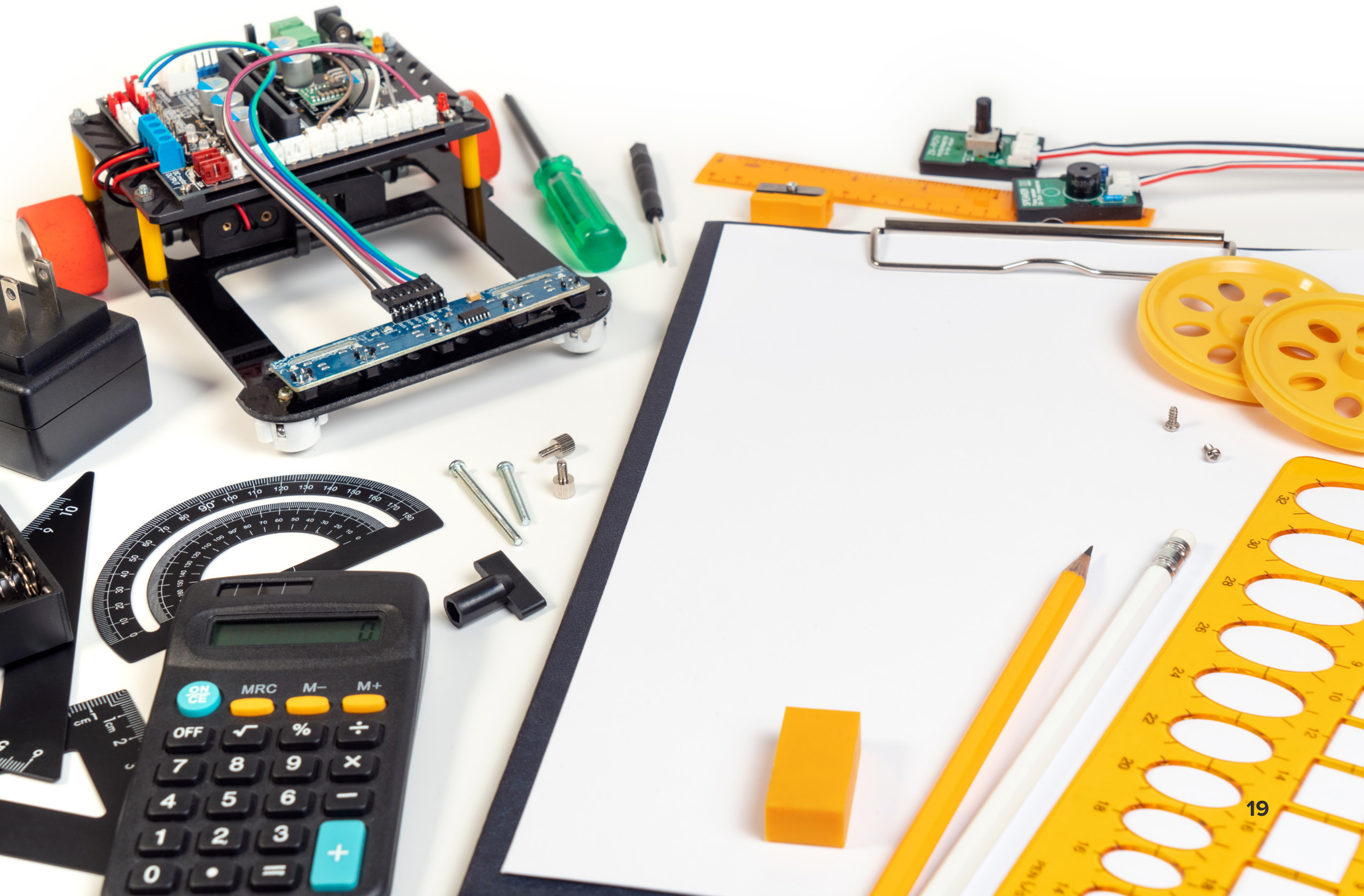
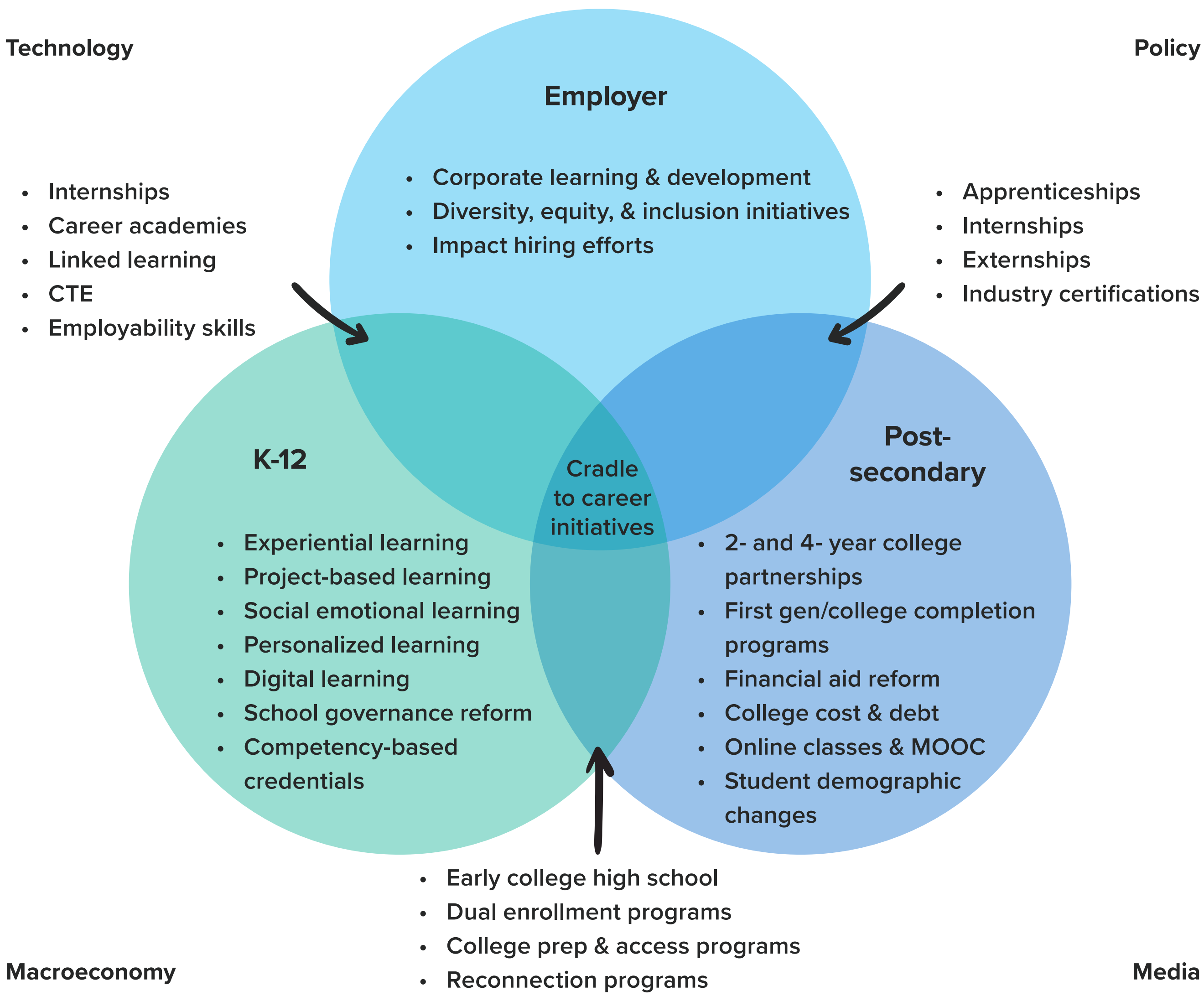


Figure 2 displays some of the issues and trends that impact the STEM ecosystem. Areas where two sub-systems come together are particularly ripe for solutions grounded in partnership across sectors. The one space where all three systems come together is for community-based cradle to career initiatives, bringing together actors across sectors to create more clear, connected, and flexible pathways through learning and into the workforce.

> ***"We need system-wide transformation at scale — not just a one-off program — to solve our STEM talent challenge."***
>
> **Al Bunshaft**
>
> *Senior Vice President, Global Affairs, Americas,*
>
> Dassault Systémes
>
> *President*
>
> The Dassault Systémes U.S. Foundation

Figure 2.

Relevant Issues and Trends in the STEM Ecosystem



K-12

The K-12 education system is growing in scope and scale. In the fall of 2017, a total of 55.9 million students attended school from pre-kindergarten through grade 12. Of these, 35.6 million were in prekindergarten through grade 8 and 15.1 million were in grades 9 through 12. An additional 5.2 million students attended private elementary and secondary schools.[13]

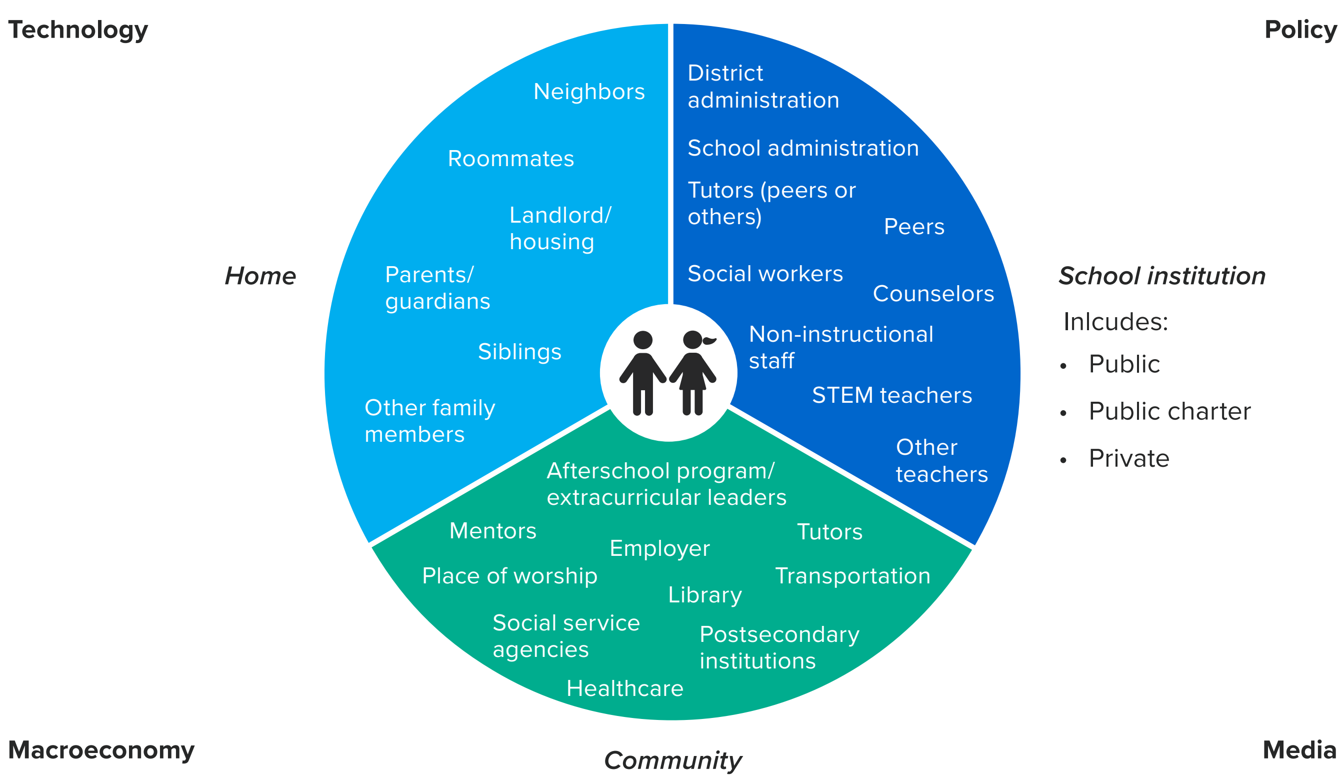
These students are served by state and local systems encompassing 13,625 school districts, with over 127,000 public and private schools that employ over 3.7 million teachers.[14]

> ***"We must appreciate and harness the power of the classroom to drive impact. To do so, educators and administrators in K-12 must more fully understand how the world of work has changed."***
>
> **Dr. Cindy Moss**
> *Vice President, Global STEM Initiatives*
> Discovery Education

Figure 3 represents the system surrounding a single student in the K-12 system, who is influenced by both the school institution as well as home and community settings. The people/stakeholders closest to the student are the strongest influences.

Figure 3.

K-12 Sub-System



Postsecondary

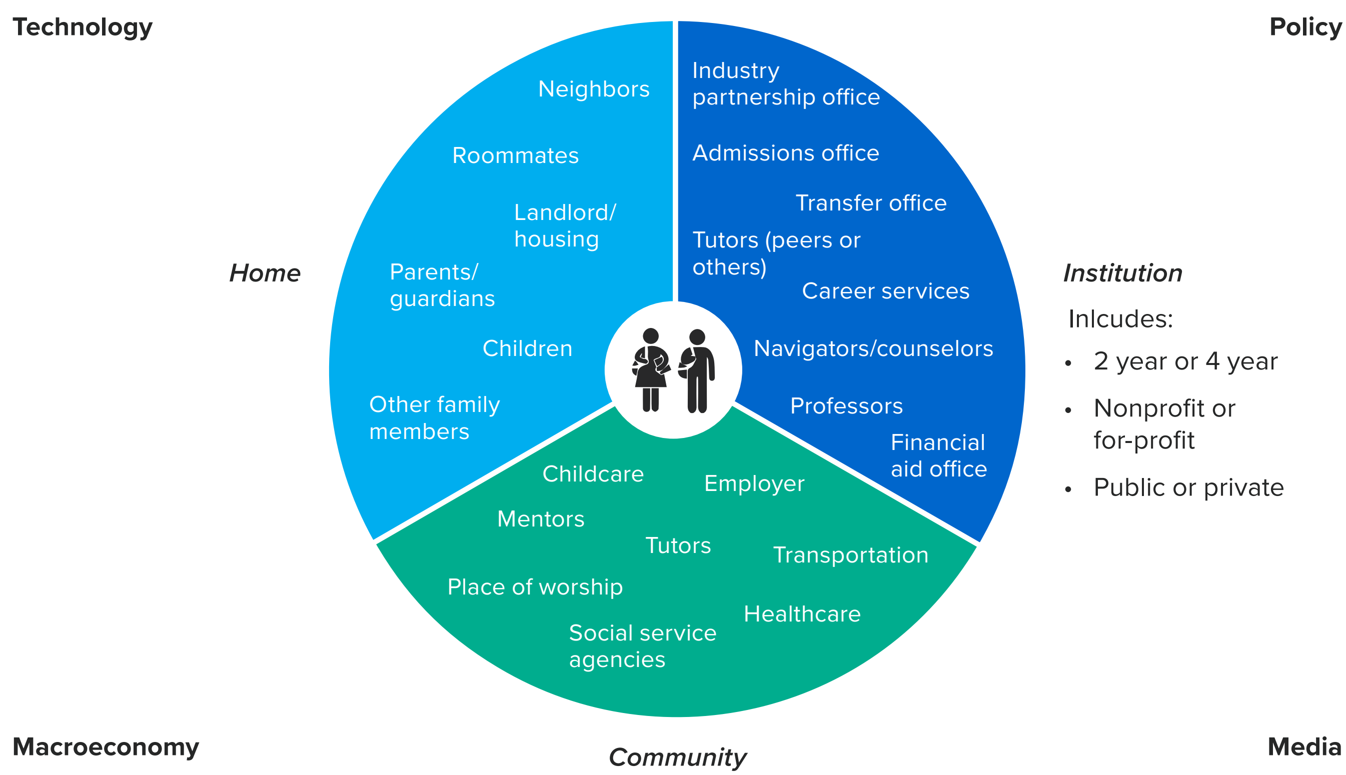
The postsecondary education system comprises a plethora of different institutions, credentials, and students, as seen in *Figure 4* below. The people/stakeholders closest to the student are the strongest influences.

There are over 7,000 postsecondary institutions in the U.S., educating over 20 million current students. Public, non-profit institutions enroll 70 percent of students, yet represent less than 30 percent of the total number of institutions.[15]

> ***"Traditionally, we have determined what skills you have via the credentials you hold from a degree granting institution. While that still holds true, we're also seeing a growth of entrepreneurial organizations that can more quickly identify and teach the skills that students and job seekers need to compete for today's jobs."***
>
> **Andy Smarick**
> *Morgridge Fellow in Education Studies*
> American Enterprise Institute

Figure 4.

Postsecondary Sub-System



There is no single "average" profile of a college student. Over 25 percent of all undergraduate students, or 4.8 million students, are raising dependent children.[16] Nearly 30 percent are age 25 or older.[17] Most college students work, and 40 percent of undergraduates work at least 30 hours a week.[18]

Despite the growth in the number and type of education options, along with college access programs, there remain nearly five million young people between ages 16 and 24 who are out of school and out of work—nearly one in seven youth in that age group.[19]

Employers

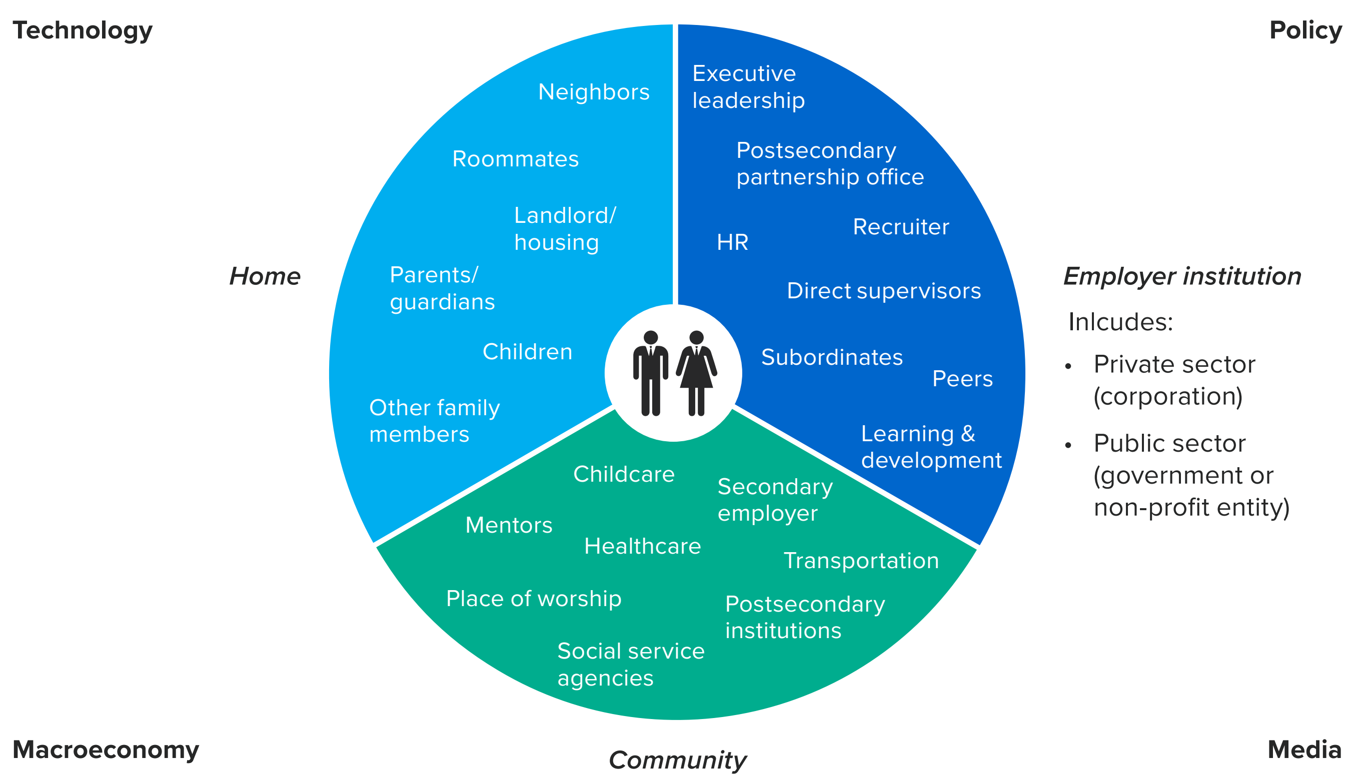
There are over 7.6 million enterprises who employ workers in the United States[20], with small- and medium-sized businesses (those with 500 or fewer employees) employing nearly 50 percent of the total United States workforce.[21] In 2015, startup or young firms (those less than six years old) accounted for 11 percent of employment and 27 percent of jobs creation. Firms more than 25 years old accounted for 48 percent of jobs creation.[22]

New jobs will be added in the next decade in occupations that reflect the technology changes in our world (such as computer sciences), and in occupations that reflect the aging demographics: five of the 10 jobs projected to grow fastest in the next 10 years are in health care and elderly assistance.[23] Jobs for people with bachelor's degrees are projected to grow twice as fast as jobs for people with just high school degrees.[24] New research suggests that automation may be creating more jobs than it makes irrelevant; however, wages appear to be stagnant.[25]

Figure 5 represents this system of employers, including both private and public sector entities. The people/stakeholders closest to the student are the strongest influences.

Figure 5.

Employer Sub-System



> ***"We must ask, how are we as companies taking the responsibility to prepare the current and future workforce for the jobs that are just around the corner?"***
>
> **Lori Beer**
> *Chief Information Officer*
> J.P. Morgan Chase & Co.

> ***"Employers continue to approach hiring with the same mindsets and practices, yet the job-seeking population and the nature of work have changed."***
>
> **Johnny Taylor**
> *President & CEO*
> Society for Human Resource Management

III.

The STEM Talent Gaps

The complexity of the STEM workforce ecosystem means it is challenging to quantify the STEM jobs available today and those that will be available in the future, along with the number of workers ready and able to take on those positions. The best definition of the "surplus or shortage" of STEM workers question is as follows:

> *Close study ... reveals that there is no straightforward "yes" or "no" answer to whether the United States has a surplus or shortage of STEM workers. The answer is always "it depends." It depends on which segment of the workforce is being discussed and where. It also depends on whether "enough" or "not enough STEM workers" is being understood in terms of the quantity of workers; the quality of workers in terms of education or job training; racial, ethnic or gender diversity, or some combination of these considerations.*[26]
>
> National Science Foundation, 2016

Box 5

Three nuanced readings on the STEM talent gap

1. **Revisiting the STEM workforce.** National Science Board. National Science Foundation.
2. **STEM crisis or STEM surplus? Yes and yes.** Richard C. Larson and Yi Xue. Bureau of Labor Statistics.
3. **STEM.** Anthony Carnevale, Michelle Melton, and Nicole Smith. Georgetown University's Center on Education and the Workforce.

As we stated at the outset, this research is not designed to count how many STEM jobs exist, nor how many qualified workers present themselves for those jobs. Rather, we seek to describe the STEM ecosystem and name its nuances in order to create a framework for action.

As such, we have uncovered **five critical gaps** in the STEM workforce and the overall workforce of the future:

1. **Fundamental Skills Gap:** industry and education have identified skills that young people need to succeed as lifelong workers and active citizens, but not enough young people are developing that foundation.
2. **Belief Gap:** young people, and adults around them, hold incorrect beliefs about the aptitude or traits young people must have to belong and thrive in STEM fields.
3. **Postsecondary Education Gap:** the new knowledge economy requires credentials beyond a high school diploma, but not enough young people are earning those credentials.
4. **Geographic Gap:** hubs of economic growth, particularly for businesses requiring STEM skills, are often far from large concentrations of qualified job seekers or far from population centers.
5. **Demographic Gap:** there is disproportionate participation in STEM jobs based on race, gender, and income, despite decades of focus on diversity and inclusion.

These gaps work together to produce the overall gap in opportunity faced by students and job seekers, as well as the companies seeking to hire them.

Fundamental Skills Gap

Over the last decade, industry and educational sectors have led efforts to identify the fundamental skills that young people need to succeed as lifelong workers and active citizens, but not enough young people are developing that foundation. This gap in fundamental skills includes both technical or content knowledge, as well as employability skills, and manifests itself in different forms.

Average STEM competency is insufficient for modern work

Say we take a simplistic view that STEM skills are about the fundamentals of mathematics and science. If the highest achieving students in K-12 STEM courses all pursued jobs in the traditional STEM fields that make up about five percent of all jobs, there might not be a talent gap.[27] However, those students do not all pursue those traditional fields, or even a STEM-related field at all. And many jobs today require STEM, not just those typically considered.

> ***"Even English majors should have some understanding of how to write code and analyze data. You don't have to be an expert, but you should be able to understand how to interact with the technologies."***
>
> **Dr. Sonya Smith**
> *Professor, Department Chair of Mechanical Engineering*
> Howard University

By this skill definition, the overall STEM competency of the average American K-12 student does not meet the demand for overall STEM skills in the U.S. labor market. The skills bar is higher to enter many jobs, particularly those in growth areas that pay a familysustaining wage. This bar is likely to continue to rise as jobs grow more complex.

The challenge of K-12 STEM skill development mastery is well-documented, and researchers have pointed to many factors including teacher preparation, curriculum, and available classroom resources.[28]

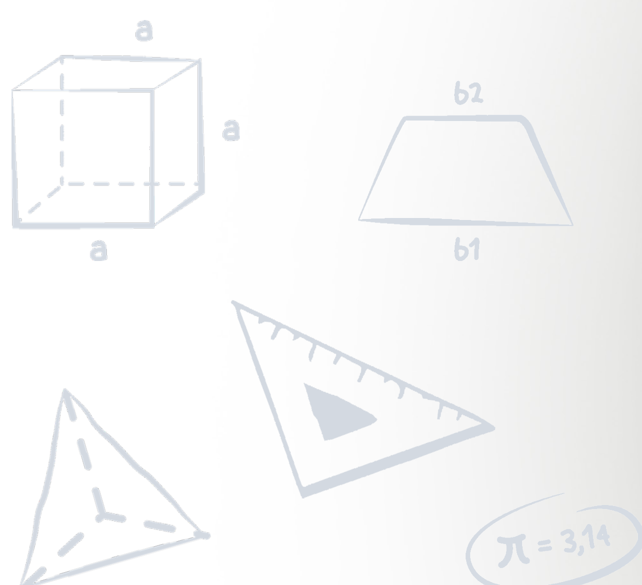
The new "STEM skills" are hard to build in traditional education models

Meanwhile, jobs outside of the traditional STEM space increasingly require fluency in STEM skills beyond basic mastery of mathematics. Tasks in many jobs—particularly those projected to grow over the next decade—are non-routine. They require a higher level of cognitive skill and ability, and often involve critical thinking, complex and creative problem solving, and ability to adapt[29]. These are the types of skills that are often developed via traditional STEM disciplines, as well as via forms of teaching and curriculum delivery that emphasize hands-on, project-based learning that is applicable to the real lives of students. While many K-12 schools and postsecondary institutions are adopting different forms of projectbased, experiential, and cross-disciplinary learning, these models have not reached scale.

> *"In the era of Google, we don't need people who can memorize, we need people who can think."*
>
> **Dan Barstow**
> *Education Manager for International Space Station*
> CASIS

> *"A student's ability to think critically and learn in an agile manner is just as important as mastery of specific technical skills. These competencies likely will outlast today's technologies."*
>
> **Eileen Yang**
> *Senior Manager, Corporate Citizenship*
> Genentech

Yet young people do not gain these skills via school alone. Rather, they build such skills through experiences in their home and communities, whether formal extracurricular activities or informal interactions with family, peers, and community members. The availability and accessibility of these experiences depends as much (or more) on the income level as the interest level of both students and parents.[30]



Employers do not always clearly or appropriately define the skills they needs

The fundamental skills gap is driven by more than student skill preparation and mastery. Employers contribute to this gap through inadequately defining and signaling skills required for each job. The skills listed in a job description may extend beyond those actually required for the role.[31] Essentially, employers may sometimes screen out talent who could do the job but could not meet the specifications of the inaccurate job descriptions.

Belief Gap

The beliefs young people hold, as well as those beliefs held and reinforced by the adults, institutions, and systems around them, create a belief gap in STEM talent. These beliefs include the aptitude, personal traits, and level of achievement required to be successful in STEM fields, as well as the nature of the fields themselves. These beliefs impact everything from interest to diversion rates in STEM education and employment.

Students hold incorrect beliefs about their own STEM ability

About half of adults say the main reason young people do not pursue STEM degrees is because students think these subjects are too hard.[32] Why do young people hold these beliefs? Perhaps because their parents or other adults recall their own struggles with these subjects. Many young people believe that if they are not able to master a STEM concept (for example, 4th grade math) immediately, or at a high level of proficiency, that STEM is not for them. Teachers may confirm this belief if they lack appropriate training in math pedagogy, or if they themselves are not confident in math.

> ***"Many students are convinced they are not and cannot be good at STEM by the time they are in high school. As educators, we must not confirm this belief. We must instead encourage students of all ages to see themselves in STEM."***
>
> **Dr. Freeman Hrabowski**
> *President*
> University of Maryland, Baltimore County

> ***"Unfortunately, many times students in the 'academic middle'—'low B' and 'C' and even 'D' students —are not encouraged to consider a STEM career. They are often discouraged and overlooked by teachers, STEM programs, and even potential employers. These students are the very students that provide a great opportunity for impacting the STEM talent gap—the truth is that many are likely economically disadvantaged, balancing life issues/priorities or don't have a connection to someone in a STEM field. We need to do better here."***
>
> **Kathleen Martinez**
> *Senior Director, National Strategic Relationships*
> BP

As a student progresses through school, well-meaning counselors may suggest that students with simply average performance in mathematics choose other topics to study in college. In college, entry level STEM classes often create a sense of "imposter syndrome," by which even those students who mastered STEM in high school do not believe they can succeed in STEM in college. While these beliefs may have some truth in any given circumstance, taken in aggregate, they are false. They serve to turn away potential STEM talent at every stage of education.[33]

Students believe only certain industries offer STEM jobs

Students may believe that only certain industries offer STEM jobs. For example, a student may think that only companies that produce consumer technology need staff with computer science skills. This leads to two challenges. One, students who are studying STEM may limit their job seeking to those few industries or companies, leading to hyper competition for those jobs. Second, students may not choose to study STEM at all if they do not think it applies to a broad array of job and industry types.

Students believe they do not belong in STEM

Beyond beliefs about skill, many young people feel they do not "belong" in STEM because of their race, ethnicity, gender, or other personal characteristics.[34] Parents, teachers, employers, and others reinforce this belief due to their own conscious or unconscious biases, creating a culture that neither welcomes nor values the contributions of those who are traditionally underrepresented in STEM. In addition, the lack of role models, including teachers and employers, who share the same background contributes to a student or employee's general sense that people "like them" do not belong in STEM.

> ***"Innovation is not solely within the realm of Ph.Ds. It takes ten technicians at the middle skill level to contribute to any single engineering breakthrough."***
>
> **Dr. Nicole Smith**
> *Chief Economist*
> Georgetown University Center on Education and the Workforce

Employers hold incorrect beliefs about how academic performance and credentials relate to job success

It's not just an issue of what students believe about themselves—it's about what employers believe about them. Beyond education, companies may overlook postsecondary graduates with average GPAs given an assumption that only the "top" students can be successful.

They may also believe that a certain type of credential conveys skill mastery, particularly for employability or non-content related skills. This leads some companies to require postsecondary degrees for roles that may not require the actual content knowledge of such as a degree.[35]

> ***"Students in STEM disciplines often suffer from imposter syndrome by their first quarter in college—they feel like they don't belong. This is partly due to the challenging transition from high school coursework but becomes more acute when students don't see themselves [their gender, their racial identity] reflected in faculty or peers."***
>
> **Beth Broome**
> *Senior Advisor to the Provost & Director of STEM Strategies*
> University of California, Davis

Postsecondary Education Gap

The new knowledge economy requires credentials beyond a high school diploma, but not enough young people are earning those credentials, nor are they earning credentials that are relevant to industry needs. This postsecondary education gap is not just about the number of graduates holding a traditional STEM degree (such as engineering), but also about the type of skills needed for success, regardless of type of credential.

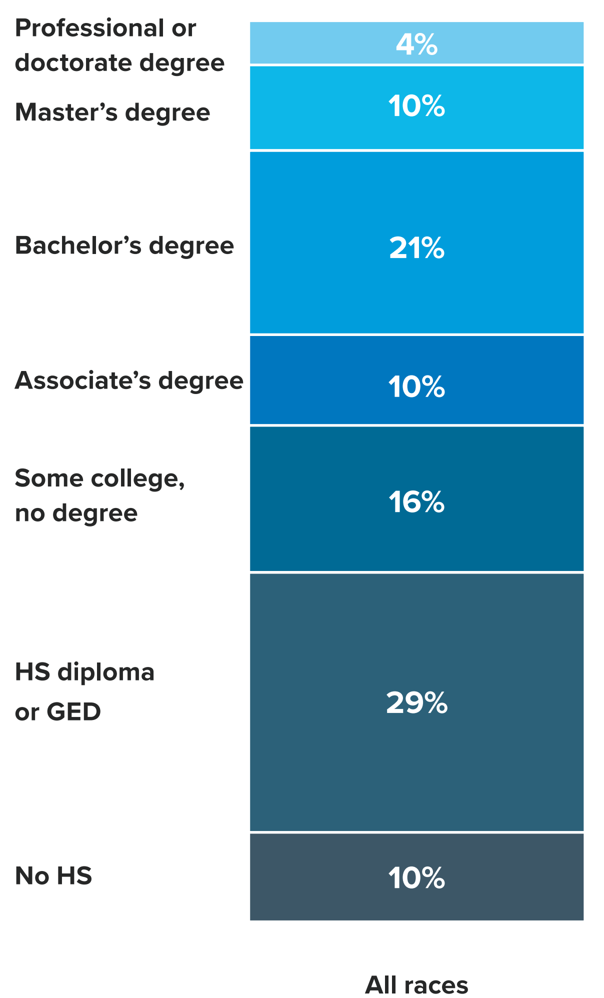
Not enough people hold credentials beyond high school

By 2020, 65 percent of all jobs in the economy will require postsecondary education and training beyond high school.[36] By some estimates, at the current production rate of students with postsecondary education credentials, the United States will fall short by five million workers. This could be an overly optimistic estimate, as the greatest job growth in the next decade will be in occupations requiring a graduate or professional degree.[37] This gap is even more pronounced in many STEM fields, where over 90 percent of all STEM occupations require at least some postsecondary education or training.[38] Yet, as seen in *Figure 6*, only 35 percent of Americans hold a bachelor's degree or higher.[39] By numbers alone, more people need to enter and complete postsecondary education credential programs.

> ***"Those of us in higher education must be more willing to acknowledge that our job is to prepare students for their jobs. While it's still important to teach students a particular subject matter, it's just as important to prepare them to be able to link that knowledge to a job."***
>
> Brian Jones
> *President*
> Strayer University

Figure 6.

U.S. Educational Attainment, 2017, Adults 25 and older



Credentials are misaligned with employer needs

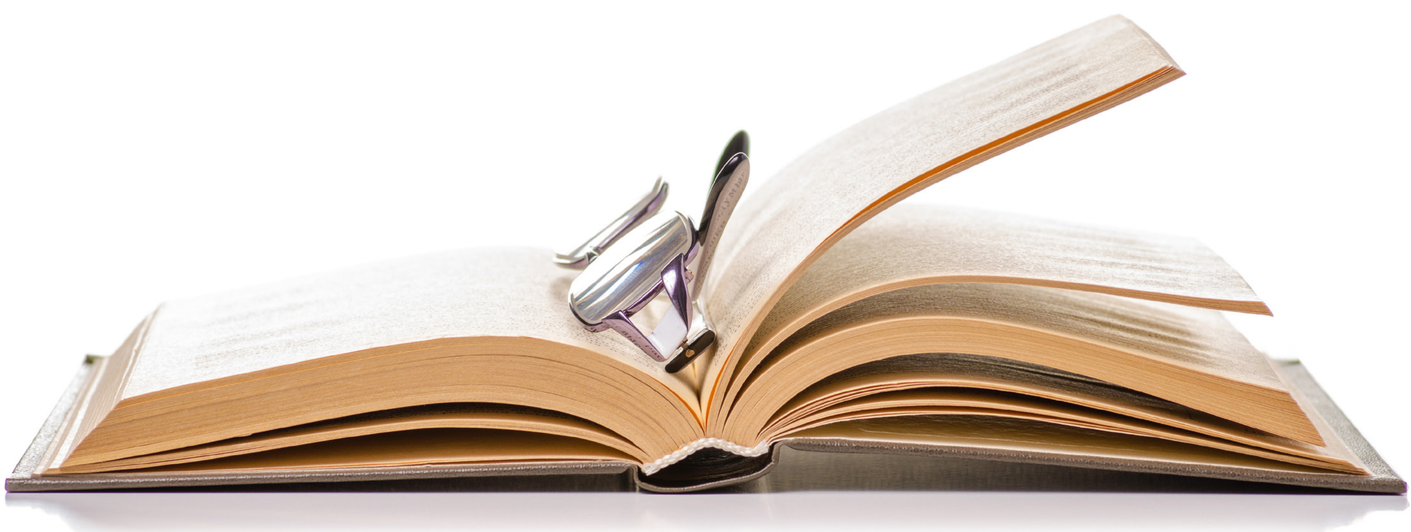
The challenge is not only around sheer numbers of credential-holding job seekers. Postsecondary institutions struggle to move quickly to adjust curriculum to the rapidly evolving labor market demand. There is also a disconnect in communication and understanding between the education sector and employers. Both trends contribute to a lack of job seekers holding appropriate credentials—that is, credentials that fit employers' needs and translate to success in a given career.[40]

Challenge of engaging in lifelong learning

Once on the job, some new employees require additional training either at the outset or throughout their careers, adapting to new technologies or gaining the skills needed to move along a career pathway. However, it can be difficult for employees to take time away from their full-time jobs to gain a new credential, especially when balancing family and financial priorities.

> *"I think business, nonprofit, and industry leaders haven't fully tapped the potential of 2-year institutions for their STEM education needs. They are nimble and well-connected to their communities, and thus easily partner with employers."*
>
> **Mark Greenlaw**
> *Vice President, Strategy & Impact*
> FIRST

Many employers invest in their own learning and development programs for existing employees. In fact, in the United States, approximately 50 percent of working adults in any given year are going through training, and there are as many corporate learning center universities as there are postsecondary institutions.[41] However, time constraints and internal value communication challenges can decrease the impact of these programs.



Geographic Gap

Access to jobs in high-growth and well-paid fields often depends on geography as much as skills, beliefs, and education. Hubs of economic growth may be far from large concentrations of qualified job seekers or they may be far from population centers, creating a geographic gap in STEM talent.

Not enough jobs, or not enough job seekers to fill those jobs that do exist

This gap is driven by many economic, political, and technological forces outside the control of job seekers or system leaders. Automation and globalization, for example, have displaced workers in many historically industrial areas of the upper Midwest.[42] The postsecondary gap has a double impact on job availability, as jobs requiring only a high school degree decline while new employers hesitate to move to those same areas of low degree attainment. In addition, changing migration habits of Americans means fewer workers are moving to find new jobs.[43]

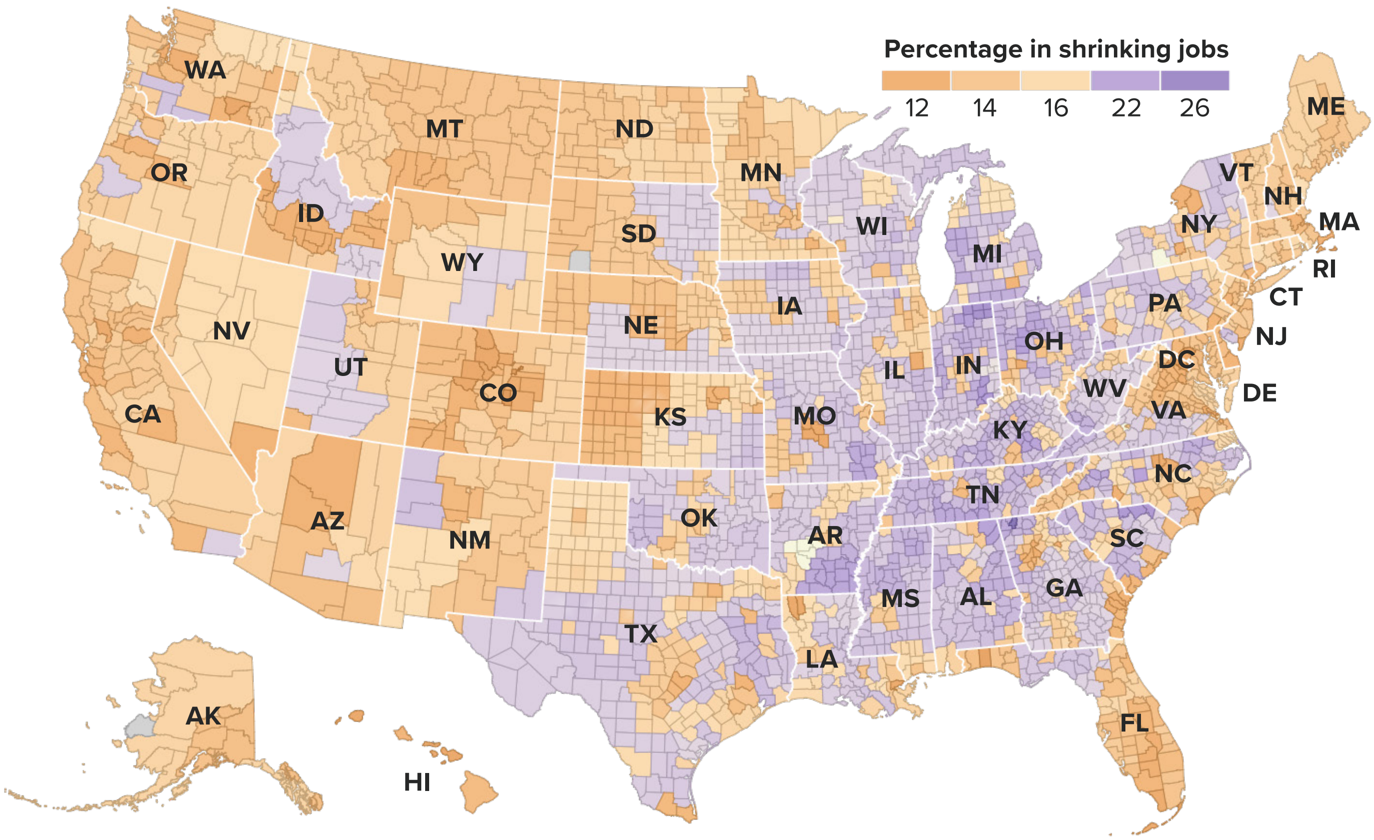
> ***"We have two STEM talent challenges in more rural areas: a warm body problem—having enough folks applying for jobs, and a right body problem — having job seekers with the right skills."***
>
> **Dr. Jill Zullo**
> *Vice President, Bioindustrials*
> Cargill

All these factors and more have led to the concentration of the fastest-growing categories of jobs in large urban areas, especially on the coasts. *Figure 7* shows the proportion of workers who hold jobs in categories that are shrinking, most prominent throughout the South and Midwest.[44]

The most complex drivers of "shrinking occupations" are the confluence of economic and policy influences and geographic limitations (e.g., agricultural or other natural resources). In these areas, enhancing awareness of and access to postsecondary education may help mitigate some of these more intractable influences.[45]

Figure 7.

Proportion of Population Employed in Occupations Projected to Decline in the Next Decade



Jobs out of reach of local workforce

While some regions of the country are experiencing either a dearth of jobs or a decline in population, others have seen a tremendous growth in STEM- related jobs and companies. Those areas face a different geographic challenge in that they may have to import talent from other regions because the local populace is not equipped with the skills and knowledge to be viable candidates for these roles. In these cases, the jobs may be down the street but far out of reach of locals. This challenge is grounded in the interaction of poverty and place and occurs in part because of the lack of opportunity in certain neighborhoods and communities.

Demographic Gap

There is a well-documented, disproportionate participation in STEM education and careers among people of color and women, and those individuals from low-income backgrounds. This demographic gap remains, despite decades of focus on diversity and inclusion across race, ethnicity, gender, socioeconomic status, and other categories.

Box 6

Aspects of demographics that often impact STEM participation include:

- Race
- Ethnicity
- Gender
- Socioeconomic status
- English as a second language status
- Disability status

"Equity is a key lever for closing the STEM gap, with the goal of having a STEM workforce that reflects the diversity of our customers and communities. Supporting efforts such as science encouragement programs and STEM scholarships for underrepresented and underresourced students can help build a pipeline of diverse STEM talent."

Jacqueline Berry

3Mgives Global Communications Manager

3M

This gap will continue to present challenges as the demographic makeup of America changes. Recent studies project that the nation will be comprised of a majority of people of color in 2045, as the combined Hispanic, black, Asian, and multiracial population grows, and the current majority white population ages.[46] Today, most public school students are non-white, and public schools are serving an increasing number of English-language learners.[47] More children in America have immigrant parents—an increase of 34 percent since 1990.[48]

Nearly 29 million of today's children will live below the poverty line for at least one year before they turn 18.[49] Black children are three times as likely to be poor as white children. Half of students in our public schools are eligible for free or reduced-price lunch, meaning their families earn no more than 185 percent of the poverty line.[50]

Access to resources drives achievement gaps

The STEM demographic gap is closely aligned to the achievement gap that has been the focus of education efforts for the last two decades.[51] While the black-white and Hispanic-white achievement gaps have shrunk over time, the gap based on income has widened. The poorest students lag, on average, four years behind their wealthiest peers in academic performance.[52] A student's race or income is highly predictive of academic outcome from 4th grade mathematics scores through postsecondary degree attainment.[53]

The demographic and geographic gaps are closely linked, as neighborhood poverty continues to impact overall access to quality education, extracurricular activities, and technology in the home. Even the most motivated student will struggle if he or she attends a school without well-equipped teachers, if his or her parents do now know about or cannot afford enrichment activities, and if he or she cannot pay for college.

> **"Diversity solutions in STEM fall short because we assume that merely inviting groups from underserved communities to have a seat at the table will lead them to participate—but what if they don't have a way to get to the table?"**
>
> **Gabriela A. González**
> *Deputy Director*
> Intel Foundation

Bias and historic inequity remain embedded in our systems

Yet access to resources alone does not create the demographic gap. Increasingly, educators and employers are becoming aware of the existence of bias and discrimination, at the individual, organizational, and systemic levels. These forces are more complex, intransient, and uncomfortable than any others. Yet they will continue to impact the composition of the overall STEM talent pool, from K-12 education through postsecondary and into the workforce.

> **"In addressing underrepresented communities, we need to listen more and talk less."**
>
> **Edwin Link**
> *National Vice President, Youth Development Operations*
> Boys & Girls Clubs of America

IV.

The STEM Talent Path Forward

The five STEM talent gaps we have identified interact with each other across the STEM ecosystem—K-12, postsecondary education, and employers—and are pressured by the forces that sit outside the systems — technology, macroeconomy, policy, and media. This interaction creates an overall opportunity gap for individual students and job seekers, a workforce development challenge for educators, and a business imperative for employers.

Several operating principles emerged based on our refined understanding of both the STEM ecosystem and the STEM talent gaps. Any solution we seek must be guided by these principles or we will continue to see isolated impact, not progress at scale.

Think systemically

This requires a deeper appreciation of one's own position in the STEM ecosystem, and of the connections between elements of the system, and of the dynamic nature of complex systems. The below recommendations for action and investment should be interpreted and applied based on your understanding of your own unique role.

Act in coordination and alignment

There is neither a single solution to STEM talent outcomes, nor a single sector that can control them.

Focus on the person

Whether a student, a job seeker, or an employee, seek to be guided by the experience of the end user of your piece of the STEM ecosystem.

Path Forward for the Field

Recommendations for action and investment are divided into two distinct but equally important categories: enhancing practice within a system and creating a more enabling environment around and between those systems.

Enhance organizational and professional practice

Many field leaders and practitioners have identified effective practices to address STEM talent gaps. However, these practices are often applied inconsistently and with varying levels of rigor. More intentionality around the dose (quantity or intensity), frequency, duration, and standardization of these practices will allow them to reach their fullest expression and lead to the most positive outcomes. These practices may yield shorter term outcomes and can often be accomplished with single partnerships rather than a more expansive cross-sector collaboration.

A. **Expose students to STEM routinely**, both in and out of school settings. This exposure must begin with the earliest learning experiences and continue throughout their K-12 years, not just once, but many times and in many ways. A greater number and variety of exposure opportunities leads to stronger outcomes. Activities, programs, and people can provide such exposure. For example, out of school time providers can embed age-appropriate STEM activities into their existing programming to provide more opportunities for students to engage with STEM.

B. **Embed experiential learning** curricula in and out of the classroom, throughout K-12, postsecondary education, and employment, to teach fundamental skills and make STEM real to students. This may include project-based and community-based learning, along with hybrid working and learning opportunities such as paid internships and apprenticeships. For example, K-12 schools can partner with local businesses to make paid internships a standard part of high school curricula for all students.

C. **Develop, translate, and provide navigation resources** and support along STEM pathways, ideally in conjunction with a strong mentoring relationship. The mentor can help coach the mentee through the key decision points and help the mentee access and interpret information. For example, postsecondary institutions can assign staff or volunteers as an advisor and mentor to meet regularly with each student, particularly those who are first generation college students, assisting with course selection and job exploration.

D. **Equip educators throughout the ecosystem** with preparation, training, and resources so they may effectively develop STEM skills in students and employees. Expand cross-sector and cross-discipline training and practice development for education (K-12 and postsecondary) and industry professionals. For example, postsecondary institutions can partner with business to offer externship programs to place faculty in business settings and business leaders in postsecondary classrooms.

E. **Evaluate aptitude, skills, and credential requirements** throughout the ecosystem. Redefine and clearly signal the types of requirements more routinely across sub-systems, and update processes for organizational decision-making accordingly. For example, employers can regularly review and update job descriptions, assessing the written description against the role needs based on input from different business units.

F. **Build a holistic set of supports and resources** around STEM learning and working pathways. Identify those personal, family, and community demands that impact success in school and work, and buffer them with programmatic and relational support. For example, K-12 institutions can partner with local nonprofit or government entities to assess student and family needs and offer referrals to support services around non-academic issues such as housing, food, and child care.

Create an enabling environment

The interconnectedness of the STEM talent gaps requires some solutions that move beyond a single professional, organization, or even system. These solutions allow best practices to come to scale and collaboration to thrive. These solutions seek to influence the forces that place pressure from outside each system, such as policy and media, or to enhance connection across systems through clear information flows and intentional partnership. These are highly leveraged solutions but require a commitment to a longer time horizon and deeper cross-sector collaboration.

G. **Leverage organizational, systemic, and population data.** Often data in the STEM space is limited to overall population level outcomes. Data on process changes, quality of practice, and system coordination can help decision-makers understand how and why the population outcomes shift. For example, postsecondary institutions can track the short, medium, and long term career path of graduates in order to use that information to shape curricula and partnerships.

H. **Align incentives** for organizations and individuals with overall STEM ecosystem talent goals. This includes professionals in education and business (e.g., teachers and HR managers), processes (e.g., testing and recruitment), and funding (e.g., university research grants). For example, employers can shift incentives for talent acquisition from activity-based metrics to impact metrics targeting business outcomes.

I. **Create, institutionalize, and target evidence-informed marketing campaigns** to different sectors within the STEM ecosystem. Changing the unclear, unproductive, and false narratives around STEM requires awareness and knowledge to change alongside practices. For example, national out of school time providers can work together to employ a social marketing campaign with ageappropriate STEM messaging delivered to students throughout their service regions. A word of caution: while shaping message and marketing is important, it is easy to choose this as a single solution or to ascribe too much influence to these forces.

J. **Connect with and/or be aware of cradle to career initiatives** in your communities and industry verticals. Many such efforts already exist and can create an amplifying effect on your investment and action. For example, employers can join a cradle to career effort in a market in which they have trouble securing local talent and share job needs and projections with education partners.

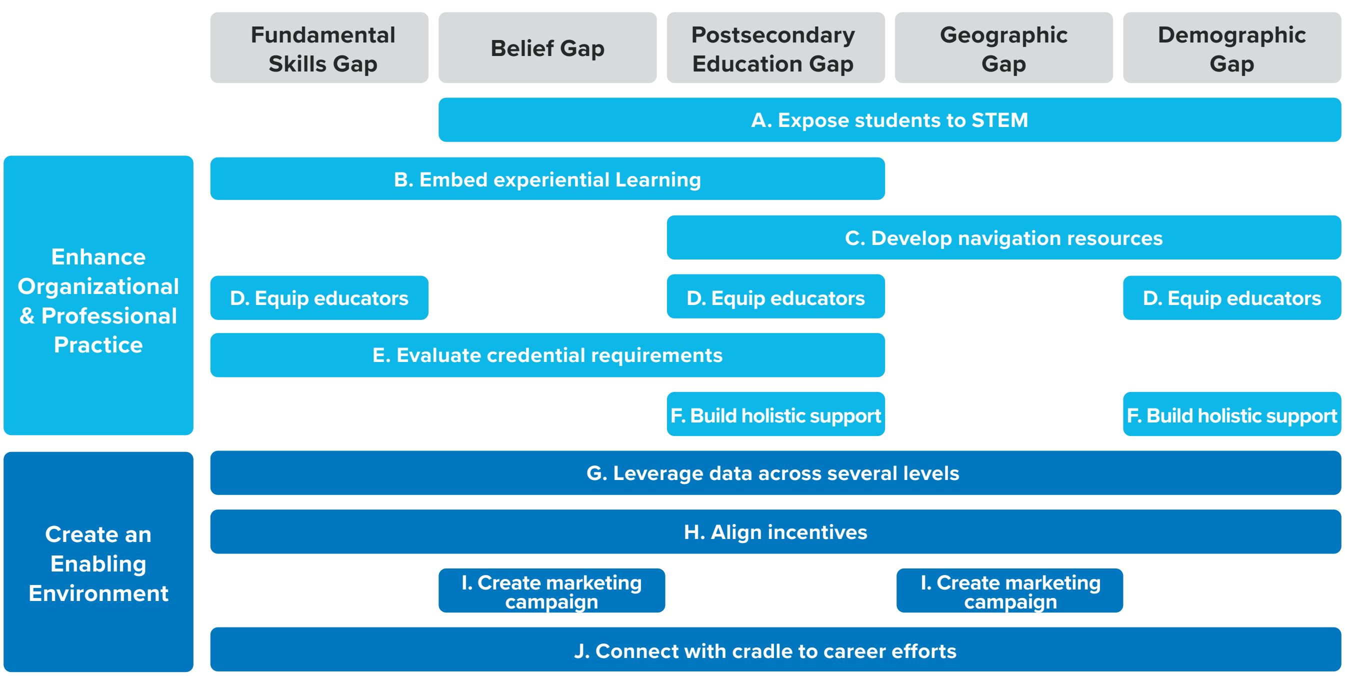
Each of these solution sets can be a powerful lever for change in STEM talent outcomes. However, the solutions are also meant to work together, just as the five STEM talent gaps work together to create the overall challenge we face. Any given solution set may impact a set of gaps, as illustrated in *Figure 8*.

Change at scale on STEM talent challenges will only occur when we address all the gaps and begin to intentionally deploy all the solution sets. This does not mean that we must invest in every solution. Rather, it means we should take a portfolio approach across the gaps that are most pressing in our sphere of influence. We may invest deeply in a specific solution set alongside a funder who is focused on another set. No one actor need to "own" the entirety of solutions. But an investment will be much more leveraged with greater intention around the location and type of solution, and alignment with other efforts.

The choice of where to invest or how to change your own practice begins with an assessment of the challenge (or gaps) you face. Then you can move to selecting the solutions that are likely to be most impactful. This assessment process must occur regularly and should include questions about the dosage, frequency, and quality of intervention. Given the dynamic nature of work and many influences on the STEM talent ecosystem, a solution set that fits in one moment may not fit in another. While the solution sets may appear simple, they must be deployed with a deep understanding of and appreciation for complexity of the STEM talent ecosystem and the gaps that emerge within it.

Figure 8.

Solution Sets That Address the Five STEM Talent Gaps



Path Forward for STEMconnector

STEMconnector will build on the research that produced this report to guide the content of our research, convenings, initiatives, and services. Our research and data will drive our decisions and be responsive to both member and market needs.

Throughout 2018, we will create a **detailed and interactive STEM ecosystem map** available via a digital interface, including specific organizations and their connections to each other. The map will further serve to identify areas for potential future collaboration.

We will also use the newly launched **Innovation Labs** as cross-sector platforms for discussion around the STEM talent gaps, to create more specific, actionable recommendations, and to apply and learn from the application of these recommendations.

In the next 18-24 months, we will produce **a series of briefs and resources** accessible to members covering other topics in the STEM talent ecosystem in greater detail. Each piece serves a different purpose or set of purposes— to more fully define a problem — to set out guiding principles for solutions, to outline solution sets, to document case studies, or to offer tools and resources.

Additional resources under consideration for 2019 include:

- STEM Strategy Resource Center: a compendium of strategy components for those investing in STEM
- Profiles of Corporate STEM Councils: a series of case studies detailing various options for their structure and function
- Global State of STEM, Country-level View: a deep dive in a single country outside the U.S. to better understand their STEM talent gaps

Conclusion

The STEM talent gap exists, though not in a manner that lends itself to easy counting and simple solutions. Rather, it is the sum and interaction of five different gaps across fundamental skills, beliefs, postsecondary education, geography, and demographics. These gaps emerge from a complex ecosystem of actors, organizations, systems, and influences.

At the heart of that complexity is an individual student, graduate, job seeker, or employee seeking to access to opportunity. The systems that surround, educate, and employ each of those individuals can accelerate and expand that opportunity by enhancing practice and building an enabling environment.

The *State of STEM* is both encouraging and challenging, full of potential and pitfalls, and calls us to move from awareness to action and, ultimately, impact.

V.

Appendix

Appreciation

This document reflects the input of many outstanding researchers, practitioners, advocates, policymakers, and young people.

A special thanks to the nearly 100 individuals who generously lent their expertise in interviews and focus groups. Your input was invaluable to this effort and we look forward to continuing to partner with you.

With our appreciation to the State of STEM 2017 Charter Members: American Society of Plant Biologists, Austin Community College, Base 11, Boy Scouts of America, BP, Campbell Soup Company, Cargill, CASIS, Chevron Corporation, Cognizant, Credit Suisse, Dassault Systémes, Deloitte, Des Moines Area Community College, Discovery Education, DowDupont, Education Works, Ford Motor Company, Gulfstream Aerospace Corporation, Honeywell, Learning Blade, Mead Johnson Nutrition, Mentored Pathways, MIND Research, Northwell Health, Northrop Grumman, Olin College of Engineering, Pearson, PepsiCo, Regeneron Pharmaceuticals, Inc., Skyline College, Tata Consultancy Services, Technology Association of Georgia-Education Collaboration, The Robert D. and Billie Ray Center at Drake University, University of California, Davis, University of California, Irvine Henry Samueli School of Engineering, Underwriters Laboratories, USA Science & Engineering Festival, Verizon, and Walmart.

Thanks to University of Maryland Baltimore County for hosting us for a remarkable site visit, and to the students who spoke with us about their experiences.

Thanks to Social Strategy Associates, particularly Justin Goldbach, Founder and Managing Director, for your support as we launched this research project.

Thanks to Karin Rotem for her encouragement and thoughtful editing.

Methodology and Interview List

Secondary research

To produce this report, STEMconnector reviewed literature across STEM and related fields, including education and youth development, workforce development, economic mobility, technology, innovation, equity, and other disciplines. Information on these sources is captured in the endnotes and in the callout boxes.

Interviews and focus groups

STEMconnector gathered the perspectives of over 100 individuals through individual interviews, group interviews, and focus groups. All individuals interviewed touched the STEM ecosystem through a variety of functions—from executive leadership to frontline education. Individuals represent international corporations, national nonprofits, local nonprofit organizations, academia, foundations, and other organizations and institutions.

The following is a list of all individuals who participated, in alphabetical order of their organization, and then their last name.

Jacqueline Berry, 3M

Nancy Barcus, Agriculture Future of America

Andy Smarick, American Enterprise Institute

Crispin Taylor, American Society of Plant Biologists

Scott Heimlich, Amgen

Kassie Hilgert, Artsquest

Chris Cervini, Austin Community College

Abby Hollingsworth, Bank of America Corporation

Ingrid Ellerbe, Base 11

Landon Taylor, Base 11

Rob Evans, Battelle

Regina B. Schofield, Battelle

Shannon Fugate, Baum School of Art

Kevin Easterling, Black Heritage Association of the Lehigh Valley

Drew Glassford, Boy Scouts of America

Michael LoPresti, Boy Scouts of America

Edwin Link, Boys & Girls Clubs of America

Kathleen Martinez, BP

Jose Rosado Jr., Building 21

Dan Restuccia, Burning Glass Technologies

Menexia Tsoubeli, Campbell Soup Company

Jill Zullo, Cargill

Dan Barstow, CASIS

Kassie Davis, CME Group

Kathryn Nash, Cognizant

Ruthe Farmer, CS for All

Mark Hays, Dallas County Community College District

Jason Treadway, Dallas County Community College District

Al Bunshaft, Dassault Systèmes

Randolph Guschl, Delaware Foundation for Science and Mathematics Education

Tonie Leatherberry, Deloitte

Cindy Moss, Discovery Education

Suzanne Thompson, Discovery Education

Anna Watt, Discovery Education

Steve Peterson, Eaton

Bryan Contreras, ENCOURA

Melanie Goodson, ENCOURA

Mark Greenlaw, FIRST

Mark Rosenberg, Florida International University

Prashant Javkar, Ford Motor Company

Eileen Yang, Genentech

Nicole Smith, Georgetown University Center on Education and the Workforce

Chris Nowicki, Gulfstream Aerospace Corporation

Jessica Katzbeck, Haven House

Sonya Smith, Howard University

Barb Bidan, Indeed.com

Gabriela González, Intel

Lori Beer, JPMorgan Chase & Co.

Dane Boyington, Learning Blade

Sheila Boyington, Learning Blade

Brendan Cotter, Lehigh and Northampton Transportation Authority

Layne Turner, Lehigh County Drug and Alcohol Services

Maggie Hadinger, Lehigh Valley Health Network

Brian Abel, Lehigh Valley Health Network

Carmen Guzman-McLaughlin, Lehigh Valley Health Network

Steven Braun, Mead Johnson Nutrition

David Neils, Mentored Pathways

Leigh Teece, Mentored Pathways

Janine Ingram, MIND Research Institute

Daphne Dorsey, Monsanto

Melissa Harper, Monsanto

Cheryl Davidson, Northwell Health

Lauren Pearson, Northwell Health

Mitzi Montoya, Oregon State University

Lori Molloy, North Penn Legal Services

Teri Haddad, PBS-39 Director of Education

Kevin O'Sullivan, PepsiCo

Deepali Palta, PepsiCo

Ignace Conic, Prudential Financial

Susan Croll, Regeneron Pharmaceuticals, Inc.

Angi Calkins, Regeneron Pharmaceuticals, Inc.

Donna Dimke, Regeneron Pharmaceuticals, Inc.

Potoula Gjidija, Regeneron Pharmaceuticals, Inc.

Michael Palis, Rutgers University-Camden

Ann Woo, Samsung

Jenny Kopach, Science Olympiad

John Loehr, Science Olympiad

Gerald Putz, Science Olympiad

Regina Stroud, Skyline College

Mark Garrett, Smithfield Foods

Alexander Alonso, Society for Human Resource Management

Johnny Taylor, Society for Human Resource Management

Kumar Garg, Society for Science and the Public

Ron Ottinger, STEM Next Opportunity Fund

Brian Jones, Strayer University

Balaji Ganapathy, Tata Consultancy Services

Lina Klebanov, Tata Consultancy Services

Lonnie Wishom, Tata Consultancy Services

Zach Levine, Teach.org

Tara Carcillo, The Clearing

Matt Davidson, The Robert D. and Billie Ray Center at Drake University

Stephanie Oppel, The Robert D. and Billie Ray Center at Drake University

Scott Raecker, The Robert D. and Billie Ray Center at Drake University

Olga Bolden-Tiller, Tuskegee University

Cara Gizzi, Underwriters Laboratories

Greg Washington, University of California, Irvine, Samueli School of Engineering

Beth Broome, University of California, Davis

Stan Elliott, University of Central Missouri

Leslie Flynn, University of Iowa

Tania Evans, University of Maryland Baltimore County

Michelle Hewitt, University of Maryland Baltimore County

Freeman Hrabowski, University of Maryland Baltimore County

Uchenna Osia, University of Maryland Baltimore County

Amanda Ross, University of Maryland Baltimore County

Greg Simmons, University of Maryland Baltimore County

Janet Marling, University of North Georgia

Marc Schulman, USA Science & Engineering Festival

Michelle Joseph, Verizon Foundation

Justina Nixon-Saintil, Verizon Foundation

Blair Bennett, Walmart

Becca Shaddox, Walmart

Lisa Raisor, Western Governors University

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