PREPARING YOUTH FOR STEM CAREERS OF TOMORROW

Insights for Science Centers and Museums

ASTC Association of Science and Technology Centers

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Preparing Youth for STEM Careers of Tomorrow

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As today's youth become tomorrow's STEM workforce, science centers and museums play a vital role. Informal learning programs— from summer camps, to afterschool classes, to industry partnerships and community-wide events—help youth explore emerging STEM fields, build hands-on skills, and cultivate identities as future STEM professionals.

For decades, science centers and museums have invested in the STEM workforce by researching, developing, and implementing innovative approaches to strengthen STEM career pathways for all people. This work has been driven by data showing the individual and collective benefits of STEM work, including:

- **Financial wellbeing** – STEM workers enjoy relatively high wages and job security.[8]
- **Personal fulfillment** – STEM work can be highly rewarding, with opportunities to learn, solve problems, think creatively, collaborate, and make a difference.[18]
- **Societal benefit** – STEM work serves a larger good by solving societal problems, increasing our understanding of the world, driving economic growth, and providing goods and services that help people.[2]

Science centers and museums have been deeply engaged in efforts to ensure that *all* people, regardless of their gender, geography, race, or background, have the means to pursue a STEM career. Today, this work must respond to major shifts—including emerging technologies like AI, rising social and political divisions, demographic changes, and global challenges.

These changes raise questions about the future of STEM careers, alongside the future of work in general.

1. **How do we define a "STEM career"?** What counts? What are the implications of the definitions we use?
2. **What STEM careers will remain in-demand and rewarding in the future?** Given significant shifts in society during the last decade, what STEM fields and roles are positioned to offer those key career benefits—financial security, personal fulfillment, and the opportunity to contribute to the broader good?
3. **What knowledge, skills, attitudes, and opportunities contribute to STEM career success?** What learning outcomes will help youth thrive in this future STEM workforce?

Implicit in all of these questions is the underlying question: **What role should science centers and museums play?** How can science centers, museums, and the STEM engagement field more broadly leverage their strengths and evolve their STEM career programming to meet the needs of today's youth and tomorrow's STEM workforce?

Rather than answering all those questions definitively, **this report highlights and synthesizes current, research-based resources related to these key questions.** For anyone who designs or facilitates career-connected youth programs in a science center or museum, these resources may offer insight, practical advice, or inspiration to try something new!

Building on a large foundation of research and practice related to STEM career learning, these suggest some strategies science centers and museums can use to strengthen STEM career pathways in the current landscape. These include:

- Broadening our definition of what counts as a STEM career, as well as the diverse pathways to accessing those careers
- Explicitly and persistently connecting STEM *content* to STEM *career opportunities,* integrating real-life examples, industries, and applied activities whenever possible.
- Enhancing opportunities for youth to build both technical skills and *durable skills* that cross disciplines and leverage, rather than compete with, automated technologies

Read on to explore the key questions in more detail, along with further resources for learning.

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1. How do we define a "STEM career"?

There are a wide variety of terms to describe STEM work in different contexts. Increasingly, there has been a push to recognize the STEM work inherent in a broader range of fields and roles, including skilled trades and the "green collar" economy.

STEM occupations

NSF's National Center for Science and Engineering Statistics (NCSES) describes three kinds of ***STEM occupations***, together employing **24%** of US workforce.[16]

- **Science & engineering (S&E) occupations (6%)** – e.g. "ologists," computer scientists, engineers. Typically requiring a bachelors degree at minimum.
- **Science & engineering-related (S&E-related) occupations (9%)** – require STEM skills and expertise, but they do not fall into the main S&E categories. e.g. healthcare, educators, S&E managers, technicians
- **STEM middle-skill occupations (9%)** - require significant STEM skills and expertise but do not typically require a bachelor's degree for entry.– e.g. construction, manufacturing

STEM jobs

The Brookings Institute defines **STEM jobs** as "any job requiring a high level of knowledge in any one STEM field, regardless of the field or educational requirements associated with it." This definition includes **20%** of US jobs (as of 2015).[17]

STEMM workforce

The AAAS report "Science at Work" defines the **STEMM workforce** (science, technology, engineering, mathematics and medicine) based on "the daily tasks involved, not just the economic sector it resides in." Their definition covers **34%** of the US workforce.[2]

How we define STEM work matters. If you ask, "Who is represented in the STEM field and who isn't?" the answer varies depending on how you define STEM work. For example, women and BIPOC individuals are particularly underrepresented in the narrowly defined "Science & Engineering occupations" category of STEM work but better represented in broader definitions of STEM work that include healthcare, management, and social sciences.[16,8] The narrow definition is helpful when it helps us see where inequities persist. At the same time, focusing on these narrowly defined STEM fields may contribute to the unhelpful notion that that careers with higher participation by women and People of Color (particularly in healthcare) aren't "real" STEM jobs.

Takeaways

- **Frame STEM as a tool for success across a wide range of careers.** Researchers have to develop specific, and sometimes restrictive, definitions around STEM work in order to track societal-level trends in the workforce. However, in the context of youth engagement, statistics and definitions are less important than the big picture message, which is: *There are a wide variety of jobs that involve STEM! And, whatever career you pursue, STEM knowledge --and skills can help you be successful.*

> "STEM is everywhere". It's not just if you want to be a doctor, engineer, or academic. In the jobs in the Twenty-first Century, no matter what your vision of success looks like... core STEM concepts are really vital to your competitiveness in the workforce."
>
> – Braeden Mayrisch, Voya Financial

- **Highlight specific, real-life roles.** Define STEM inclusively, but not ambiguously. Name specific industries, employers, and roles that involve STEM, to help youth build awareness of the variety of opportunities available. Educate yourself and staff on the breadth of STEM careers, the types of entities that employ STEM workers (including nonprofit, for-profit, academia, independent research orgs, public sector, etc.), and what these jobs/employers look like in your community.
  - ✓ For example, in the context of an engineering-themed summer camp, this might mean engaging a software engineer working for a tech company, a civil engineer working for the city, and an exhibit developer working for a museum to talk with youth about their job and the path that led them there.

- **Cultural relevance** – consider the lived experiences and identities of the youth in the program. Highlight careers that are locally and culturally relevant, and feature role models who share youths' identities and experiences.

Explore more

NSF SCIENCE & ENGINEERING INDICATORS

The STEM Labor Force: Scientists, Engineers, and Skilled Technical Workers

Pew Research Center

Diversity in the STEM workforce varies widely across jobs

THE BROOKINGS INSTITUTE

The Hidden STEM Economy

AAAS

Science at Work: The People and Industries powering America's prosperity

2. What STEM careers will remain in demand and rewarding in the future?

Economic, technological, demographic, and political shifts are reshaping the workforce. We will continue to see changes, both in the demand for various STEM professions and in the type of work those professionals perform. Some of these changes include:

- **Shifting demographics** and an aging population will continue to drive demand for healthcare workers.[15]
- **Shifting federal priorities** around the scientific enterprise have resulted in acute job losses as well overall uncertainty for research-related STEM professions, in particular.[13]
- **Growing energy demands**, complicated by rapidly developing technology, increasing investments in the field, and the need for scalable renewable energy sources will drive demand for skilled workers in the energy field.[10]
- **Advanced technologies** like AI will affect STEM work differently—sometimes replacing tasks, sometimes enhancing them, and sometimes creating new demand.

How will AI affect STEM work?

- ✓ Up to 30% of current work hours for STEM professionals could be automated by 2030, especially in administrative, production, and customer service roles.[7]
- ✓ STEM-related and high-skill professions will see rising demand, while lower-wage roles face displacement.[7]
- ✓ AI is augmenting more jobs than replacing, but it's shifting the skill mix toward tech fluency, creativity, and emotional intelligence.[3]
- ✓ AI adoption is accelerating, and firms that invest in it are growing faster and hiring more—but they're hiring differently.[3]

The good news is that, even with projected changes in the US economy and society, STEM work (by all definitions) is expected to remain in high demand.[7] Compared to non-STEM careers, STEM careers are expected to continue offering better wages and job security. This remains true even when accounting for education level; for example, a STEM job requiring 2 years of college pays, on average, more than a non-STEM job requiring 2 years of college.[8]

Within this landscape, certain STEM fields and roles are expected to see overall high or increasing demand. These include:

- ✓ Healthcare, especially nursing and specialized care
- ✓ Energy, including renewable energy
- ✓ Computer and data science, including software developers
- ✓ Management, including management of STEM-related business
- ✓ Construction and advanced manufacturing
- ✓ Engineering and design

Pay and opportunity matter, but they're only part of what makes work rewarding. Today's youth also care deeply about the nature of work—including work-life balance, social impact, and workplace culture. [12, 22] Some STEM industries and employers have begun to recognize that training and retaining the Gen Z workforce will require a significant shift in their workplace practices and cultures. [6, 11, 20]

Takeaways

- **Don't neglect AI literacy.** Regardless of their chosen field, most people will need a baseline understanding of both the technical and socio-ethical dimensions of AI.
- **Pay attention, but keep the long view.** Stay abreast of economic, political, and demographic shifts that affect the workforce, both in your own community and nationally, particularly when those shifts are expected to persist (as with AI). At the same time, when working with youth, it's important to take the long view; adjust your approach to account for new skills, industries, and fields where relevant, but know that the field will continue to shift as youth grow and enter the workforce. You are preparing them, not for today's workforce trend, but for a future that is still being written.
- **Consider what makes a job rewarding—beyond just numbers.** While it's important to know what fields are likely to remain well paid and in demand, economic opportunity is just one aspect of a rewarding career. Youth may be drawn to other benefits of STEM work, such as the opportunity to be creative, balance work/life demands, or make a difference on issues they care about. Help youth explore a variety of ways, means, and styles of work, to discover what is rewarding to them and what roles and fields align with their goals.

Explore more

McKinsey Global Institute — Generative AI and the future of work in America

U.S. Bureau of Labor Statistics — Bureau of Labor Statistics Fastest Growing Occupations

Jobs for the Future — Preparing Today's Youth for the Jobs of the Future

Gallup Walton Family Foundation — Voices of Gen Z: Perspectives on STEM Education and Careers

3. What attitudes, knowledge, and skills contribute to STEM career success?

STEM career pathways are shaped by countless experiences and circumstances that create—or limit—access to opportunities, while shaping career-related ***attitudes***, ***knowledge*** and ***skills***.

- **Attitudes**. Researchers in the workforce field often use Social Cognitive Career Theory (SCCT),[14] which identifies three main attitudes essential for persisting in a STEM career path.
  - ✓ Interest ("This is interesting and exciting! I want to learn more about it.") Research shows that ages 8-14 are particularly rich years for establishing STEM career interest.
  - ✓ Positive outcome expectancy ("I believe a STEM career would be good to have.")
  - ✓ Self-efficacy ("I believe I can succeed in a STEM career.")

- **Knowledge**. Two kinds of knowledge can help advance a STEM career path.
  - ✓ Knowledge about STEM careers—awareness of specific opportunities and pathways for accessing them. ISL experiences that connect youth with real-life industries, employers, or relatable individuals can be very powerful.
  - ✓ Knowledge of STEM content. Understanding STEM content is important in many STEM careers, and developing content knowledge is central to most STEM education programs. STEM content can also be very fun and drive STEM interest! However, mastery of STEM content, on its own, is not necessarily a strong driver of STEM career success.

- **Skills**. Shifting workforce trends suggest that *durable skills* will become increasingly critical for career success; at the same time, applied and technical STEM skills are still important.

  - ✓ Durable skills are essential! As defined by STEM Next, "Also known as soft skills or 21st-century skills, durable skills are skills we use to share what we know, like critical thinking, collaboration, creativity, and communication, as well as character skills like growth mindset, fortitude, and leadership."[19]
  - ✓ Technical skills still matter, especially for programs preparing older youth for specific STEM industries. For example, students preparing for a career in aeronautics can benefit from being able to fly a drone, read a map, and interpret weather data. More broadly, working on technical skills (particularly in a hands-on, real-life context) can help youth develop those positive attitudes, like self-efficacy and interest, while simultaneously building transferable and durable skills, such as problem-solving and teamwork.

Takeaways

- **Identify your target outcomes**. (And don't try to target them all in a single program). Are you trying to affect a particular attitude or skill? Choose strategically and design your program accordingly.

- **Create pathways from *interest* to *exploration* to *opportunity*.** Science centers and museums excel at fostering STEM interest.[1, 5] This work is valuable, particularly for younger youth who are establishing core attitudes about STEM which, in turn, help shape their future career paths. However, research indicates that "interest in STEM careers" *on its own*, does not equate to "intention to pursue a STEM career."[8] Build on that interest by providing (or connecting to other programs that provide) more focused and applied opportunities for career exploration and preparation, particularly for older youth. This might look like internships, career ladders, micro-credentials, or partnerships with colleges or career technical education (CTE) programs in high school.

- **Think "braided river," not "pipeline."** There is no straight line between a museum-based learning experience (or *any* experience) and STEM career success—only many, interconnected pathways within a broader ecosystem. In a pathway model, STEM experiences—and the resulting attitudes, knowledge, and skills that youth develop—are interrelated and often reinforce each other. Some researchers are adopting a "braided river" metaphor to describe the many and varied learning paths that can lead to STEM career success. [4]

> "The overall labor market will have higher demand for social-emotional and digital skills. Although the demand for basic cognitive and manual skills is likely to decline, physical work is not going away."
>
> –McKinsey Global Institute[7]

Explore more

A Model of Factors Contributing to STEM Learning and Career Orientation

CTE Employability Skills Framework

STEM Next Career Connected Learning Framework

STEM Career Outcomes: It's the Journey not the Destination

Putting it all together: The role of science centers and museums

Science centers and museums bring unique resources and strengths to the challenge of STEM workforce development. This work is not new, but ongoing—evolving in response to the unique realities of today's youth and tomorrow's workforce. As this work evolves, it is important for science centers and museums to continue thinking on a STEM ecosystem-level. Where in the "braided river" of career learning opportunities can we have the most impact? As you develop program goals, consider:

- What are we good at?
- What opportunities are available locally? Where can we fill a gap or add value?
- What do youth and the broader community want?

Science centers and museums have long fostered curiosity, hands-on learning, and meaningful connections to real-world science. In a rapidly shifting workforce landscape, this role is more important than ever. By broadening how STEM careers are defined, intentionally connecting learning to real-world pathways, and helping youth build both durable and technical skills, science centers and museums can equip young people—not for a known or static career path—but for future, STEM-rich careers that are still being written.

References

1. Adams, J. D., Gupta, P., & Cotumaccio, A. (2014). Long-term participants: A museum program enhances girls' STEM interest, motivation, and persistence. *Afterschool Matters, 20*, 13–20. https://files.eric.ed.gov/fulltext/EJ1047233.pdf
2. American Association for the Advancement of Science (AAAS). (2025). *Science at work: The people and industries powering America's prosperity*. https://scienceisus.org/wp-content/uploads/2025/04/science-at-work-economic-impact-report-2025-APRIL-FINAL.pdf
3. Babina, T., & Fedyk, A. (2025, July 1). *The effects of AI on firms and workers*. Brookings. https://www.brookings.edu/articles/the-effects-of-ai-on-firms-and-workers
4. Batchelor, R. L., Ali, H., Gardner-Vandy, K. G., Gold, A. U., MacKinnon, J. A., & Asher, P. M. (2021, April 19). Reimagining STEM workforce development as a braided river. *Eos*. https://eos.org/opinions/reimagining-stem-workforce-development-as-a-braided-river
4. Bell, J., Besley, J., Cannady, M., Crowley, K., Grack Nelson, A., Philips, T., Riedinger, K., & Storksdieck, M. (2019). The role of interest in STEM learning and science communication: Reflections on interviews from the field (CAISE Interest Overview). Center for Advancement of Informal Science Education. https://informalscience.org/wp-content/uploads/2022/02/CAISE-Interest-Overview.pdf
5. Deloitte. (2024). *Welcome to Gen Z* (PDF). https://www.deloitte.com/content/dam/assets-zone3/us/en/docs/industries/consumer/2024/welcome-to-gen-z.pdf
6. Ellingrud, K., Sanghvi, S., Dandona, G. S., Madgavkar, A., Chui, M., White, O., & Hasebe, P. (2023). *Generative AI and the future of work in America* (Report). McKinsey Global Institute. https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america
7. Funk, C., & Parker, K. (2018). Diversity in the STEM workforce varies widely across jobs. Pew Research Center, 9.
8. Gallup, Inc., & Walton Family Foundation. (2024). *Voices of Gen Z study: Year 2 annual survey report*. https://www.gallup.com/analytics/544742/walton-family-foundation-pdf-report.aspx
9. International Energy Agency (IEA). (2025, December 5). Energy employment has surged, but growing skills shortages threaten future

momentum. https://www.iea.org/news/energy-employment-has-surged-but-growing-skills-shortages-threaten-future-momentum

10. Jae, B. (2025). What we're getting wrong about Gen Z's future in the skilled trades. *Area Development.* https://www.areadevelopment.com/skilled-workforce-stem/q3-2025/what-were-getting-wrong-about-genzs-future-in-the-skilled-trades.shtml
11. Jobs for the Future. (2024, December 10). Preparing today's youth for the jobs of the future. https://www.jff.org/idea/preparing-todays-youth-for-the-jobs-of-the-future/
12. Kozlov, M., Tollefson, J., & Garisto, D. (2026). US science after a year of Trump: What has been lost and what remains. *Nature, 649*(8098), 812–815.
13. Lent, R. W., Brown, S. D., & Hackett, G. (2002). Social cognitive career theory. *Career choice and development, 4*(1), 255–311.
14. National Center for Health Workforce Analysis (NCHWA). (2024). *State of the U.S. health care workforce, 2024* (Report). U.S. Department of Health & Human Services, Health Resources & Services Administration, Bureau of Health Workforce. https://bhw.hrsa.gov/sites/default/files/bureau-health-workforce/state-of-the-health-workforce-report-2024.pdf
15. National Science Foundation (NSF). (2024). *The STEM labor force: Scientists, engineers, and skilled technical workers* (Science and Engineering Indicators 2024; NSB-2024-5). National Center for Science and Engineering Statistics. https://ncses.nsf.gov/pubs/nsb20245/
16. Rothwell, J. (2013, June 10). The hidden STEM economy. *Brookings.* https://www.brookings.edu/articles/the-hidden-stem-economy/
17. STEM Greenhouse. (2023). Why STEM careers dominate the happiest jobs list. https://stemgreenhouse.org/why-stem-careers-dominate-the-happiest-jobs-list/
18. STEM Next. (2025). *Career-Connected Learning: A framework for out-of-school providers*. https://stemnext.org/career-connected-learning-framework/
19. Tepfenhart, O. (2025, January 6). The real reasons why America's Gen Z is turning away from STEM. *Medium.* https://medium.com/@ossiana.tepfenhart/the-real-reasons-why-americas-gen-z-is-turning-away-from-stem-b368d18f2512
20. U.S. Bureau of Labor Statistics. (2025, August 28). Fastest growing occupations. U.S. Department of Labor. https://www.bls.gov/ooh/fastest-growing.htm
21. Youth Futures Foundation. (n.d.). What is 'good work'? https://youthfuturesfoundation.org/about-us/what-is-good-work