STEM Policy Statement

Introduction

At the Empire State STEM Learning Network, we envision high-quality Science, Technology, Engineering, and Math (STEM)[1] education that provides a well-informed and transformative experience for all learners and partners. In a world that increasingly values analytical thinking and innovation, integrating STEM learning from an early age not only enhances children's cognitive skills but also equips them to thrive in the dynamic demands of our current and future technological landscapes. This rapid pace of technological advancement also continues to challenge the skill sets needed for success in STEM careers. Furthermore, the growing demand for additional STEM professionals underscores the need to increase exposure to STEM for all students, thereby broadening the pipeline. Efforts to meet this vision are guided by our two core beliefs that:

1. All students from Pre-K through postsecondary must have access to high-quality STEM education without instructional, financial, or technological barriers.
2. Access to STEM education and career exploration is crucial to building a thriving workforce, which is essential to America's global competitiveness.

For the STEM Network, high-quality STEM education is rooted in three key areas to create a robust STEM education that prepares students for a competitive global workforce:

- **Pedagogy** that is evidence-based and promotes 21st century skills for all learners.
- **Resources** to ensure that all students, educators, and other crucial partners involved in the STEM ecosystem have the tools, technologies, and knowledge needed to advance high-quality STEM education.
- **Experiential and work-based learning opportunities** provide hands-on experiences that connect classroom learning to real-world applications and career exploration.

Challenges Facing STEM Learning in New York

In New York State, PreK-16 students' preparation for STEM careers is hindered by systemic barriers in education and workforce alignment. Inconsistent access to quality pedagogy and STEM opportunities creates disparities in academic preparation and resources across schools. A persistent shortage of qualified STEM educators threatens the ability to sufficiently recruit qualified educators and successfully prepare them through continuous professional development for high-quality STEM education. As a result, many educators, both formal and informal, lack training in interdisciplinary evidence-based teaching practice. In cases where they do, science instruction is often deemphasized in elementary teacher

[1] Reference to STEM education may also be used interchangeably with other terms like STEAM, STREAM, and Integrated STEM, all aiming to foster skills in science, technology, engineering, and mathematics. The Empire State Learning Network's reference to 'STEM' is not intended to diminish the value of approaches that integrate other subjects.

preparation programs, undermining exposure in the early years when young students begin to develop their interests.

These educational barriers contribute to a broader disconnect between students' learning and the evolving demands of the STEM workforce. Due to both financial and programmatic barriers, many students are unable to access hands-on STEM learning opportunities. This is compounded by a lack of resources for parents, caregivers, and school counselors to guide students in exploring STEM career pathways. Furthermore, there is a misalignment between education and workforce needs, which is compounded by regional gaps and a lack of reliable data. This limits students' opportunities in STEM and career readiness.

Priorities for the Empire State STEM Learning Network

The Empire State Learning Network has identified nine priorities that would help school leaders, policymakers, STEM educators, and partners statewide advance high-quality STEM education in New York, as outlined below:

1. **Adopt evidence-based STEM curricula and practices, with a focus on project-based learning, teamwork, and interdisciplinary STEM integration.** It is essential for New York educators to seamlessly integrate STEM learning into the school curriculum, ensuring they adopt evidence-based best practices and resources that experts have thoroughly vetted. A paradigm shift emphasizing hands-on, minds-on learning, for instance, is an evidence-based approach that is more effective than other traditional forms of teaching and learning (NGSS Lead States. (2013). *Next Generation Science Standards: For states, by states*. National Academies Press. https://www.nextgenscience.org/).

2. **Promote students' proficiency in essential STEM skills through expanded access to formal and informal learning opportunities.** Experiential learning opportunities that are connected to career pathways are crucial for enhancing students' career success. Additionally, informal learning through afterschool and summer STEM opportunities, as well as other expanded learning programs, provides students with a fun space to experiment with STEM activities and spark an interest in STEM careers.

3. **Offer strong professional development for PreK-16 STEM educators, incentivizing continuous training and certification in STEM pedagogy.** From teacher education programs to ongoing STEM training, professional development for both formal and informal educators is crucial in delivering effective STEM instruction. Professional development equips educators with current information, tools, and practices to foster continuous improvement toward a more effective learning environment.

4. **Allocate funding to initiatives and capacity-building efforts that enhance student interest and participation in high-quality STEM education.** A range of instructional approaches, pedagogy, and programming provide opportunities for immersive STEM experiences for youth and educators,

reinforcing the need to fund different models of STEM education delivery. In addition to adequate funding and effective implementation, developing funding proposals and structures that ensure critical stakeholders are informed ensures that resources are allocated effectively and align with local needs and priorities.

5. **Capitalize on the important role that postsecondary institutions play in strong STEM ecosystems.** Strong ongoing partnerships between secondary and post-secondary educational institutions can help foster strategic collaborative efforts in workforce development, skill-building, and research and development that enhance enrollment and access to experiential learning opportunities, ultimately strengthening students' pathways to relevant career opportunities.

6. **Collect and utilize data to improve STEM education and training, and inform regional economic/workforce needs, prioritizing opportunities.** Access to relevant data helps stakeholders evaluate and make informed decisions on curriculum, professional development, student performance on STEM-related education, and perceptions of career opportunities.

7. **Spark youth interest in STEM exploration and careers, starting in Pre-K through elementary school.** As early as three years old, children begin to exhibit signs of critical thinking, a skill that progressively develops as they mature. Integrating STEM skills in early learning helps develop critical thinking in young children and fosters a love of STEM learning through exploration, creativity, and curiosity.

8. **Support the role of guidance counselors and caregivers in fostering students' pathways to success in STEM fields.** When caregivers are aware of STEM opportunities and counselors have powerful resources, they can better guide students in making informed choices about education, careers, and STEM pathways during college and in selecting careers.

9. **Strengthen STEM partnerships between PreK-12 schools, higher education, and business and industry to achieve a highly skilled and educated workforce for employment in high-demand STEM fields.** Different stakeholders within the STEM ecosystem have different needs that can be addressed through strategic, collaborative partnerships, helping to bridge the gap between STEM education and workforce needs.

Present Opportunities for New York to Build On

Ongoing discussions and initiatives around educational excellence, workforce development, and graduation requirements create a promising landscape full of opportunities to build on and enhance STEM access for all learners. These opportunities include:

Portrait of a Graduate: Now more than ever, STEM partners face the urgent challenge of accelerating progress in STEM pedagogy as the field continues to evolve and expand. As New York State reassesses graduation measures, this presents a pivotal moment to rethink how students are taught and evaluated on their STEM experience to demonstrate proficiency in each component of the Portrait of a Graduate,

the framework for future assessment of high school graduation and workforce readiness in New York State.

Bolstering career and technical education (CTE) and apprenticeships: Career-connected learning and apprenticeships remain a top priority in New York State and present a valuable opportunity to build upon, especially in light of the financial challenges to achieving universal access to work-based learning. Additionally, the landscape of expanded learning and Career and Technical Education (CTE) funding remains complex, with the need for continuous investments to transform experiential learning opportunities in STEM.

Keeping up with educator preparation: Access to high-quality in-service teacher education is often restricted by high costs and limited availability, compounded by evolving teacher certification requirements that demand adaptive approaches to professional development and coursework. Concurrent teacher residency programs that provide professional development offer a promising avenue for evidence-based teacher education, allowing educators to gain practical experience while learning in real-world settings.

Making STEM data relevant to decision-making: New York mandates schools to collect certain student data, such as student graduation requirements, and this existing mandate could be leveraged to include the collection of data on STEM outcomes. This effort can be built upon through collaborative partnerships with education and community stakeholders to capture relevant and current data related to STEM education, exploration, and access.

Leveraging the role of informal STEM learning: Experiential learning in STEM opportunities—occurring in various settings, including before school, after school, during summer, during school hours, and/or outside the traditional classroom—helps students bridge the gap between education and real-world experience. Recognizing and supporting informal learning through afterschool and summer STEM opportunities, as well as other expanded learning programs beyond the traditional school day, provides students with a fun space to experiment with STEM ideas and spark an interest in STEM careers.

Promoting public-private partnerships to advance New York STEM: A disconnect exists between students, STEM partners, and local workforce opportunities. Strategic partnerships and collective impact frameworks must align resources to ensure effective STEM pedagogy, address barriers to high-quality education, and create an employment pipeline through experiential learning (internships, apprenticeships, and career exploration). For example, through collaborative efforts, K-12 schools can expand access to career exploration programs, helping youth and families connect with local businesses, agencies, and organizations.

About Us

The Empire State STEM Learning Network is a statewide collaborative of educators, business and industry partners, and government leaders in New York working to expand access to high-quality STEM teaching, increase the number of students in STEM disciplines, and communicate and advocate for STEM policies, programs, platforms, and partnerships. The Network comprises regional hubs that are aligned with New York's Regional Economic Development Councils.

The State University of New York (SUNY) has served as the steward for the Empire State Learning Network since 2011. SUNY is the largest comprehensive university system in the United States, with 64 campuses strategically located across the State. The exciting partnership between the Empire State STEM Learning Network and SUNY provides unprecedented scale-up opportunities for the Network and a new platform for collaboration.

Empire STEM is a proud member of Battelle's STEMx national network of over 31 statewide STEM networks (http://www.stemx.us/).

Mission: Advancing STEM education to prepare all students in New York State for success in school, work, and life through the mobilization of interconnected regional STEM hubs whose goals are relevant to locate needs, capacities, and priorities aligned with the network's mission, vision, and design principles.

Vision Statement: Bridging STEM education and industry innovation through robust industry-aligned STEM programming, policy supports, and enduring partnerships over the long term.

This policy agenda was developed with the valuable input and collaboration of the following workgroup members. Their expertise, insights, and commitment to advancing STEM education were instrumental in shaping this work:

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