STEM EDUCATION

> *"Some things will drop out of the public eye and will go away, but there will always be science, engineering, and technology. And there will always, always be mathematics."*
>
> Katherine Johnson

STEM (SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH) IS FOR EVERYONE

At its core, STEM is about asking questions and solving problems. These are fundamental skills that are critical for life in the 21st century. Ensure policies support equitable access to STEM education, and that STEM educators reflect the children in the communities they serve.

EARLY EXPERIENCES WITH STEM ARE CRITICAL

It is never too early to provide rich, age-appropriate STEM experiences. These experiences are like a charging station. Early experiences lay a foundation by "charging" children up for later learning and skill building. Support programs that provide access to high-quality STEM experiences for young children and their families.

MAKE STEM LEARNING SOCIAL

STEM is all about teamwork. Research shows that children and adolescents are more motivated in STEM when they feel connected to others. Promote curricula and programs that center interactive, collaborative STEM learning.

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THE RESEACH: STEM EDUCATION

Too often when we think about STEM (science, technology, engineering and math), we think about a certain kind of person. Women, persons with disabilities, and Black, Indigenous, and Latinx people are underrepresented in high-paying STEM careers.[1] While many factors contribute to these inequities, effective policies and programs *can* promote all students' interest and participation in STEM activities and careers.[2]

All children are born scientists. From birth, we observe and learn from others and try to figure out how the world works. With this natural curiosity as a foundation, we all have the ability to build STEM skills. Yet, from an early age stereotypic images and examples of who "should" have a STEM career influence children's interest in STEM.[3] **When young children have access to positive STEM experiences, however, they begin to see themselves in these careers, rather than avoiding them due to stereotypes.**[4] Early, positive experiences with technology are particularly powerful for girls and boost their interest in STEM.[5] Providing early and equitable access to STEM experiences is critical for broadening recruitment into STEM careers.

The types of STEM learning experiences children have also impact their long-term success and participation in STEM.[6] Curricula that emphasize independent study are outdated. **Social, collaborative experiences are key to supporting children's developing STEM skills**. Research demonstrates that children and adolescents are more motivated in STEM when they feel connected to others and see how STEM can be used to help and bring people together.[7,8] The physical learning environment is important, too. Beyond providing opportunities for social interaction, the environment can communicate cues about which students belong there. For example, girls are significantly more interested in participating in STEM courses and activities when they take place in environments that look welcoming, and are inclusive and free of stereotypic imagery.[2]

Children also need to see examples of STEM professionals that they can identify with, like a Black doctor who works in their community every day, or a female civil engineer who builds their city. Representation matters. **Children and adolescents build strong connections with STEM (e.g., 'I can code!') when they have the opportunity to form positive relationships with role models and teachers with whom they identify.**[9,10] Building a pipeline that recruits and educates a representative teacher workforce is critical for developing an inclusive STEM community.

Research-based practices that broaden participation in STEM support all students. **All children benefit from social, inclusive learning experiences guided by adults they trust**. Policies focused on creating and providing early access to age-appropriate, collaborative STEM learning are critical for building communities ready to meet the demands of the 21st century.

RESOURCES & REFERENCES

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