Report: U.S. Needs Better Support, Research for Early STEM Learning

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Stacking blocks. Playing at a water table. Building forts. These are all things children do and enjoy from a young age. In addition to being fun, a new report from The Joan Ganz Cooney Center at Sesame Workshop New America says these brain and skills-building experiences demonstrate that children are ready to engage STEM learning early in life—but they're often not given the opportunity to do so.

Why not?

The "STEM Starts Early" report delves into this question, addressing its findings about the somewhat-grim early STEM landscape, as well as six recommendations on how to fix it.

"Just as the industrial revolution made it necessary or all children to learn to read, the technology revolution made it critical for all children to understand STEM," the report

reads. “To support the future of our nation, the seeds of STEM must be planted early, along with and in support of the seeds of literacy. Together, these mutually enhancing, interwoven strands of learning will grow well-informed, critical citizens prepared for a digital tomorrow. [But] the barriers to STEM learning for young children are more complex, subtle and pervasive than decision-makers currently realize.”

Those barriers include eager but ill-prepared parents and teachers, research and public policies and a poor communications effort.

Many parents—and teachers—experience anxiety and low self-confidence about STEM topics, which can easily transfer to young children. According to the report, these two groups would benefit from reconsidering STEM in the context of “developmentally informed, playful learning.”

One way to facilitate this is for parents to use technology to connect school and home with learning environments like libraries and museums.

“Parents, teachers, technology, museums and libraries create a web of charging stations where children can power up and extend their STEM learning. Immersion in this web of STEM learning leads to STEM fluency,” reads the report. “Museums and other learning environments are effective engagement points for both parents and children, and even brief parental instruction at these venues can have an important impact on how parents support STEM learning.”

Specifically, teachers need more robust training and professional development. The report argues both pre- and in-service training should be available. Teachers could then be trained to think of STEM as mutually inclusive of other subjects, and encouraged to weave STEM into existing curricula and play times—something that is not done often, currently.

“STEM Starts Early” argues education policies must focus on “great alignment and continuity across the early grades, starting with preschool.” Part of this focus involves incorporating teachers and other practitioners as early as possible in the education reform process.

Lastly, the report favors the use of future strategic communications effort since “the public holds misconceptions about STEM learning.”

“[Examples include] it is for older students, children should learn other topics first, it is only important for those who especially excel in these areas, that STEM and other learning topics must be taught separately. When communicators do not carefully frame their messages, they can inadvertently activate and strengthen these misconceptions. The use of research-tested messages about early STEM learning makes a statistically significant, meaningful, and positive difference in the public’s support for early STEM learning,” the report explains.

Recommendations

Based on the findings addressed above, the report's authors suggest the following six recommendations for establishing a high-quality STEM learning environmental from birth through eight years of age.

- **Engage parents:** support parent confidence and efficacy as their children's first and most important STEM guides
    - Communicators should emphasize what early STEM learning actually looks like, providing accessible examples like a community garden, testing which bath toys float and sink.
    - Policy makers, community leaders and media producers should work to make early STEM learning and support more accessible to parents using mobile technology.
- **Support teachers:** improve training and institutional support for teaching early STEM
    - Preparation and training programs should be designed to allow teachers to experience STEM learning in the same ways that children will.
    - Researchers should disseminate findings in formats accessible to teachers, addressing teacher concerns. Demonstrations of successful early STEM teaching should be made more accessible
- **Connect learning:** support and expand the web of STEM learning "charging stations" available to children
    - The president and cabinet should activate the executive agencies, partnering with states and cities to ensure that early STEM educators have access to the internet to collaborate, take professional-development courses, update lessons, conduct assessments that inform teaching, and provide age-appropriate digital tools for documentation and analysis in the classroom.
    - Public and private funders should continue to fund initiatives like Ready to Learn, which support family engagement in STEM learning.
- **Transform early childhood education:** build a sustainable and aligned system of high-quality early learning
    - All levels of government, along with state and community leaders, should apply existing and new funding resources to improve general early childhood teaching and quality.
    - Special attention should be paid to address professional preparation, staff development, and continuing education, with attention to the vast disparities in compensation, benefits, and work conditions that exist between K–12 educators and their counterparts in early learning settings

- **Reprioritize research:** improve the way early STEM research is funded and conducted

    - CoSTEM and the White House Office of Science and Technology Policy should take stock of what research is being funded on early learning and STEM across the federal agencies and research organizations. The information gathered would allow the identification of knowledge gaps and form the basis for a government-wide strategy to support early STEM learning R&D. A similar effort should be initiated by governors and chief state school officers at the state level.
    - An expanded effort could focus attention on the T, E, and M in STEM and use teacher researchers to inform future study designs.
    - Research agency leaders should establish an interagency and interdisciplinary research program with emphasis on early learning and STEM.
- **Communicate clearly:** use insights from communications science to build public will for integrating STEM learning in early education

    - Current agendas for action are misaligned with the emerging scientific consensus on early STEM learning: they are geared towards preparing older children for careers with the goal of making the national economy more competitive, and in imparting specialty knowledge on a smaller population of "capable" youth.
    - National, state, and local leaders should convene summits on the future of Early Learning and STEM.