
NSF Stories

# At what age do children begin identifying with STEM? The answer is younger than we thought

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Much of early childhood development is well-documented and understood. For example, most parents know that children have favorite foods, colors and toys by the ages of two or three. And children begin developing their ideas about themselves and the world around them by age seven. But what is less defined is at what age children begin developing their own ideas about STEM and where they fit in it. Knowing and understanding this is vital to cultivating a positive STEM identity, as research has shown that exposure to role models and STEM at an early age is instrumental to reducing the gender gap in innovation. But how young is an “early age”?

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An 11-year-old girl's drawing of a female scientist working in a laboratory. This image is from one of the studies used in this research.
Credit: Vasilia Christidou, Aristotle University of Thessaloniki

According to the latest U.S. National Science Foundation-funded research published today in *Psychological Bulletin*, the answer is much younger than previously thought. David Miller and his team at the American Institutes for Research conducted the largest-ever study on children's STEM stereotypes by synthesizing 98 studies across 33 nations spanning over four decades of data and representing more than 145,000 children.

They found that, when it comes to reading and writing, children of both sexes believe that girls are better. However, when asked about computer science and engineering, the answer was the opposite. As Miller explained, "By the age of 6, children already believe that boys are better in computer science and engineering, but mathematics is a far less gendered field." These perceptions, even at a young age, can influence the development of a child's STEM identity.

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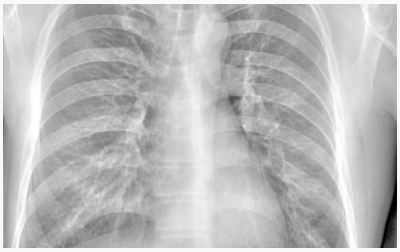

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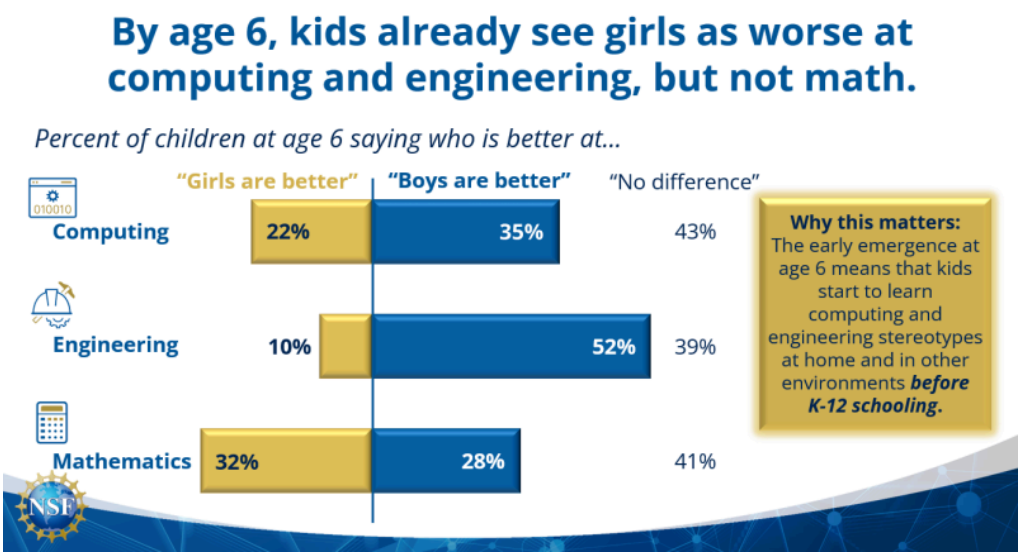


Graphic illustrating the percentage of children that indicated which gender was better at a particular STEM category. Children indicated that boys were better at computing and engineering, while girls were better at mathematics. Children that did not think a particular gender was better than the other are also represented.
Credit: NSF

This thinking might partially explain why, despite women and girls making up more than half of the U.S. population, in 2021, only 35% of the STEM workforce were women. "There has been extensive research on how to get girls into math and science, but what this research shows is that it's actually the more male-dominated areas, such as computer science, engineering and physics, that we should be targeting," observed Miller. In 2021, according to the NSF National Center for Science and Engineering Statistics, when looking at STEM fields most impacted by the gender divide, women accounted for only a quarter of computer science occupations and just 16% of engineering jobs.

These stereotypes could contribute to the gender gaps in STEM pursuits. So, what can parents and pre-K educators do? "High-quality learning and engagement experiences with computer science and engineering are very important, as well as highlighting for both boys and girls how these fields can have tangible benefits for people directly around them," emphasized Miller. To support parents and pre-K educators, the NSF has collected the following NSF-funded resources designed to introduce STEM to children at a young age.

STEM resources for pre-school aged children:

- PBS Kids for Parents has several resources organized by age to help parents and educators find ways to engage children in STEM, as well as browser games associated with their favorite TV shows.
- In "Work It Out Wombats!" preschool children learn computational thinking along with a family of wombats and their friends.
- "Elinor Wonders Why" teaches preschoolers to ask questions when they don't understand something and how to use scientific inquiry to find the answers.
- "Cyberchase" teaches children practical applications of math and how it is used to solve real-world problems.
- "Peep and the Big Wide World" is a TV show that teaches preschoolers about the world around them, and the website features games for children, as well as resources for parents and educators.
- ScratchJr is an app that teaches coding to children ages 5-7 by helping them program their games and stories.

**Research areas**

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