Transcripts
STEM Integration in K-12 Education
The National Academies

What is STEM?

It's the acronym for science, technology, engineering, and mathematics, the disciplines that are vital for a thriving economy and a safe and healthy society.

In kindergarten through 12th grade in the United States, most STEM teaching and learning focuses on science and mathematics. Comparatively little attention has been paid to the "T", the products and systems that meet human needs and "E", the creative process used to design these things. And, for the most part, the four subjects have been taught in isolation.

But new reform efforts - like the Next Generation Science Standards - are placing more emphasis on the connections between and among the STEM disciplines. To understand how this trend might affect teaching and learning in the future, we need to take a closer look at integrated STEM education, not just the individual subjects that make up the acronym. After all, in the real world, science relies on technology, mathematics, and engineering -- and engineering depends on findings from science, the application of mathematics, and the use of technological tools.

Imagine if K-12 students were taught in ways that highlighted these connections. Would they learn more and more deeply? Might they see STEM disciplines as more relevant to their lives? Could it lead more of them to pursue STEM courses and careers?

The answers to these questions depend in part on how integrated STEM education is implemented in schools and in out-of-school settings. Research suggests that implementation has to balance learning in the individual STEM subjects with more connected ways of learning. In addition, because it can be hard for students to make these connections themselves, teachers will need to make the connections explicit.

Inside the classroom, some teachers may use instructional approaches like problem-based learning or engineering design, which are special kinds of problem solving, to introduce integrated STEM education to their students. Outside the classroom, students are being exposed to STEM connections in museums and science centers, through after-school experiences, like some TV shows and STEM-focused robotics competitions, and in internships.

However, we need more research to better understand the potential benefits and limitations of integrated STEM education for students, teachers, and schools.

What, for example, are the implications of integrated STEM education for how schools are organized?

How can teachers be better prepared to teach in integrated ways?

And how can we test kids to determine what they are really learning and able to apply as a result of integrated STEM experiences?

The list of questions is long, but getting answers is important for students, teachers, and the nation.

For more information about integrated STEM education, check out the STEM Integration in K-12 Education report.