

Frequently Asked Questions

About this Resource

This resource puts forth some of the commonly asked questions about our approach. It uses categories of questions that fall under one of six headings: why, what, how, who, where, when. The responses provide further insight and sometimes direct the reader to additional locations for information. Please reach out with any additional questions.

Why?

Why integrated STEM?

STEM education is at a crossroads. It has the potential to open doors for all students to develop and apply the knowledge and skills in STEM that are needed for college, careers, and informed citizenship. Yet implementation of STEM largely takes the form of discrete, often disconnected courses in math and science, with minimal attention to engineering and technology and few learning experiences that integrate STEM across disciplines. Integrated STEM reverses this trend, placing innovative and meaningful experiences directly into the core curriculum for every student in pre-kindergarten through grade twelve.

Why integrated STEM for all students?

Historically and still currently, females and students of color continue to be underrepresented in STEM coursework (2023, [National Center for Education Statistics](#)). As an equity move to reverse this trend, our systemic approach places integrated STEM directly into the core curriculum for all students. This levels the playing field and gives every student a solid STEM education and prepares them for future STEM careers and STEM-informed citizenry. Moreover, our approach requires student-centered instruction so that students drive and help guide the lessons, building their efficacy and identity as STEM practitioners.

Why computer science and engineering?

STEM Occupations account for more than half of the employment in major industries with engineering and computer science making up the largest occupation groups in STEM.

Further, the U.S. Bureau of Labor and Statistics makes clear that STEM career opportunities are growing at more than twice the rate of other occupations—computer science and engineering in particular (2017, [U.S. Bureau of Labor Statistics](#)). All students need solid preparation through meaningful experiences in these areas which are a point of emphasis in our approach to integrated STEM.

What?

What is integrated STEM?

Our approach to integrated STEM creates a PreK-12 pathway by placing innovative curricular units into the core instruction of math and science courses for every student at every grade level. Each unit emphasizes engineering and computer science, while also addressing state standards for math, science, and English language arts. See our [infographic](#) to see how these integrated components of STEM fit together.

What is in an integrated STEM unit?

Each unit has four major sections.

- **The Big Picture:** This section conveys the larger aspects of the unit—namely how the four STEM areas come together, the primary aim for each STEM area in the unit, and a suggested sequence to unfold the unit over time for students.
- **STEM Dive:** This section fleshes out greater detail for each of the four STEM areas in the unit. It also includes literacy and language integrations for the unit.
- **Assessment Tools:** The tools in this section help teachers gauge student progress at various points in the unit—specifically, at the beginning of the unit, throughout the engineering design process, and once the culminating design solution is complete.
- **Engagement:** This section provides engagement ideas and materials lists for conducting the design challenge in classroom and distance learning settings.

View [Creating PreK-12 STEM Pathways through Integrated STEM Units](#) to learn more.

What is the range of units that have been developed?

This project developed 52 units overall. For elementary grades pre-kindergarten through grade 5, each grade level presents four units during the year, totaling 28 elementary units. For middle grades 6, 7, and 8 there each math and science course presents two units, totaling 12 middle grades units. At high school, each of the following core courses present two units during the year, totaling 12: Algebra I, Geometry, Algebra II, Biology, Chemistry, and Physics.

How?

How are teachers trained and supported?

Each implementation site receives an orientation focused on the purpose and goals of integrated STEM (i.e., The Why), which is followed by direct training on the units by teacher leaders on the District Implementation Team. Additionally, each implementation site identifies a school-specific Site Implementation Team which dedicated and ongoing district guidance and support to help their staff successfully implement integrated STEM.

How were the units developed?

A group of nearly two dozen practicing teacher leaders were nominated by school and district leaders and came together from across the district to form the Standards and Curriculum Team (also known as the “Design Team” for short). This team received intensive professional learning on the state standards for STEM and English language arts. Additionally, they explored deeply two instructional frameworks to which each unit align: [project-based learning](#) and [rigorous and relevant instruction](#). Embedded in the professional learning sessions were work periods dedicated to applying the learning by creating the first integrated STEM unit for their math or science course. From the first successful unit, the teams moved on to replicate the process.

Who?

Who developed the integrated STEM units?

Teacher leaders with a demonstrated knowledge of standards and curriculum came together to form the Standards and Curriculum Team, which developed the 52 units. It was dedicated and talented classroom teachers who developed the units with support and oversight from the project leaders to ensure the units were aligned to the proposed frameworks and goals.

Who supports school and district administrators?

CTAC provided direct technical assistance to district leaders throughout the project. The Tracy Unified School District senior leadership, beginning with the Superintendent, made clear early and often to all stakeholders that integrated STEM was a top priority and would be a regular part of existing meetings, support sessions, and conversations. The project also introduced a strategic work team structure to engage all levels of the system and the community to ensure a successful implementation. View our [Work Teams Structure](#) resource to learn more.

Who from the local union/association was involved?

Local union leaders serving teachers and administrators in the district came together before the work was ever launched. Throughout the project, union leaders influenced project design, raised concerns, and celebrated successes. Union leadership remains dedicated to ensuring that integrated STEM is a reality for every student.

Where?

Where did this work originate?

This work began as a partnership of [CTAC](#) and the [Tracy Unified School District](#) in California. The district has more than 14,000 students and is located about 60 miles east of San Francisco in the Central Valley.

Where else is integrated STEM being implemented?

While we are aware of other approaches, our unique approach has gained national interest. We are seeking partners who want to bring this integrated STEM work to their districts. Contact Scott Reynolds, Director STEM Initiatives at CTAC at stem@ctacusa.com to learn more.

When?

When are the integrated units taught?

Elementary grades (PreK-5) have four units placed throughout the year during science instruction. Secondary grades (6-12) have two units placed throughout the year during core math and science courses. The units can be taught in any sequence based on local context and generally take four to five weeks to complete in full.

When did this work begin?

This work was officially launched October 1, 2018 through the assistance of the U.S. Department of Education's [Education Innovation and Research \(EIR\) program](#). It built on prior STEM efforts of the Tracy Unified School District and CTAC during the first project year where planning and design for the first cohort of schools began, then scaled over the five-year project period to all 17 school sites in the district.

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