About STC Middle School

Science and Technology Concepts™ Middle School (STCMS) is a hands-on, inquiry-centered, research-based curriculum proven to raise test scores in science, math, and reading and to close the achievement gap among English language learners and economically disadvantaged students. Each of the program’s nine units is designed around a coherent learning progression that addresses NGSS standards and three-dimensional learning and that integrates phenomena and engineering design challenges to bring science to life in the classroom and make learning relevant to all students. Each unit includes the following:

- **Teacher Edition**, which includes preparation and procedural information to facilitate instruction; supporting information on the design approach to align the curriculum to NGSS; implementation and differentiation strategies to ensure instruction is accessible for all students; and a description of the assessment system of STCMS.

- **Student Guides**, durable student books that include procedural instructions for the lessons and investigations, as well as the Building Your Knowledge and Extending Your Knowledge reading selections that extend students’ understanding of the phenomena and concepts being studied.

- **Laboratory equipment** needed to conduct the investigations. This provides middle school students with immersive, experiential learning in which they have multiple opportunities to observe and interact with phenomena being investigated.

- Access through Carolina Science Online® and the Smithsonian Science Education Center’s website to **online digital resources**, including videos and simulations, that allow experience with and observation of phenomena and/or problems that are not easily accessible in the classroom.
STCMS Improves Student Achievement

In a US Department of Education 5-year i3 grant, the Center for Research in Education Policy at the University of Memphis conducted a randomized control study involving over 60,000 students annually. They longitudinally followed elementary and middle school students in three diverse areas of the country to study the effectiveness of STC and STCMS curriculums. **The study demonstrated statistically significant and educationally meaningful improvements in student achievement on standardized state tests and performance-based assessments.** For example, in participating Houston Independent School District middle schools, **reading, math, and science scores increased for all students, including English language learners and economically disadvantaged students.** The current STCMS units were designed and developed from the lineage of the research-based STC program and draw pedagogy and practices from more than 30 years of hands-on, inquiry-based science curriculum development.

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**Science Scores Increased**  
**Math Scores Increased**  
**Reading Scores Increased**

![Graphs showing improved scores](image)

* statistically significant results  
# educationally meaningful results  
LASER group  
Comparison group
STCMS Program Development

The development of STCMS stemmed from the organization of the performance expectations and learning progresses in the Framework and NGSS. Topics for each unit were determined by sorting these performance expectations into related “bundles” from which coherent storylines could be built. This process required an extensive and careful review of the Framework and NGSS. The resulting storylines drove the organization of each unit. The goals were for the curriculum to:

- include all the science and engineering domains;
- cover all middle school performance expectations;
- distribute the performance expectations among grade levels to group content into coherent unit storylines;
- integrate science and engineering practices and crosscutting concepts throughout the curriculum beyond those associated with performance expectations; and
- engage students in authentic, practice-based science.

Each storyline was aligned to a set of performance expectations based on disciplinary core ideas and learning progressions; this alignment determined which crosscutting concepts and engineering practices would be addressed within a unit. In addition, careful consideration was given to the progression of crosscutting concepts and science and engineering practices over the course of a unit. This resulted in the integration of three-dimensional learning to build toward understanding of the targeted performance expectations.
In Tab 6: Unit Investigations, the beginning of each lesson provides specific details to support the teacher in implementation. The opening of every lesson features a chart that provides overview information about each part of the lesson, including objectives, concepts, key terms, estimated class time, NGSS standards, and an assessment strategy. After that is a detailed lesson overview, which ties the lesson objectives to previous and future learning in the unit; identifies common misconceptions that students may have regarding the lesson content; and provides science content background information for the teacher. This section also highlights alignment to NGSS information, detailing the performance expectations that the lesson addresses and how the lesson investigations integrate disciplinary core ideas, science and engineering practices, and crosscutting concepts.
Other features that support teachers in implementation include in-depth preparation and setup instructions, and teacher investigation instructions that include images of student pages. Taken together, these features provide teachers with the information necessary to guide all students to success using STCMS.

STCMS has the core ingredients of an effective NGSS-based science curriculum. The curriculum was designed with careful consideration of the progression of the three dimensions to support student sensemaking of the units’ selected performance expectations. Developers built thematic units along strong conceptual storylines and employed effective research-based science pedagogy to create experiential, hands-on investigations of phenomena. Building in the effective supports to enable teachers to successfully implement the curriculum was a necessary component to ensure that the curriculum reaches all students. These elements, when viewed together as a complete curriculum, make STCMS the right choice for teaching middle school science.