

Community Collaboration Introduces Students to Real-World STEM Careers

CASE STUDY

Uplift Summit International Preparatory, Arlington, Texas

10th Grade Demographics

- Suburban charter school, grades 6-12
- 350 students
- Title I school
- 50% Hispanic
- 25% Asian
- 16% African American
- 8% White
- 50% free and reduced lunch

Challenge

As a former engineer, teacher Susan Patterson wanted to bring her work experience to life for her algebra 2 and pre-calculus students, with activities beyond those offered by field trips. Her goal was to give students opportunities for hands-on analysis and trigger their critical thinking skills based on exposure to real people working in real jobs.

Susan welcomed the chance to attend a free workshop at the Perot Museum of Nature and Science that showed teachers how to integrate Spark 101 STEM videos, created by STEM professionals and aligned to national curriculum objectives, into their lesson planning.

The training session and the adoption of Spark 101 STEM videos in North Texas had been funded by several 114th Partnership partners, including Educate Texas, the largest network of STEM academies in the United States. Educate Texas supports a regional implementation model to train teachers and develop content from North Texas STEM employers, such as Lockheed Martin and PepsiCo, in partnership with Spark 101.

“Our vision is to help low-income high school students learn what work looks like in the real world, because these kids miss out on tangible experiences,” said George Tang, Educate Texas Chief Operating

“Our goal in helping to fund Spark 101 is to expose students to STEM careers and develop their problem-solving skills.”

George Tang, Chief Operating Officer, Educate Texas, a 114th Partnership Supporter

Officer. “Our goal in helping to fund Spark 101 is to expose students to STEM careers and develop their problem-solving skills.”

Implementation

In Susan’s tenth-grade classroom, the 10-minute Spark 101 videos are giving students actual industry problems and the opportunity to develop their own solutions.

A video called “Using Tower Cranes to Solve Engineering Problems” reinforced students’ understanding of circles in preparation for the geometry section of the SAT and ACT. Student groups compared different solutions to the problem of how best to utilize the cranes within a prescribed construction area and also examined how the geometry affected the cost of the project. According to Susan, “Students saw the range of engineering career options for the first time. They were no longer intimidated and realized that they could actually do these jobs—from project manager to architectural engineer to quality assurance expert to insurance specialist.”

To reinforce pre-algebra skills, students also watched a video called “The Chemistry of Long-Lasting Lipstick.” “They saw why scientists need to understand fractions and percentages to make lipstick that works,” said Susan. “Students got to see female as well as male professional role models, and they were very engaged.”

“Students saw the range of engineering career options for the first time. They were no longer intimidated and realized that they could actually do these jobs.”

Susan Patterson, Algebra 2 and Pre-Calculus Teacher, Uplift Summit International Preparatory

Impact

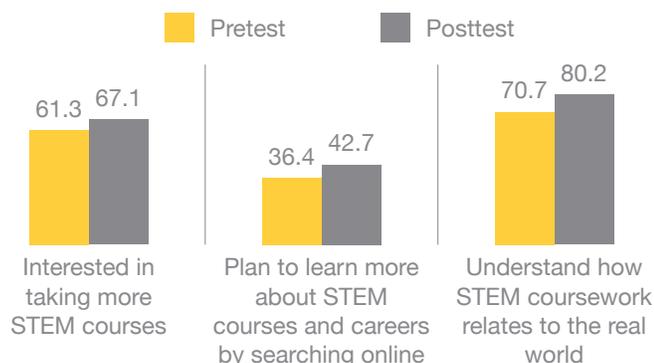
Students enjoyed the videos and retained the content well. Engagement increased in the form of discussion and collaboration, and critical thinking improved as students became more analytical and more skilled at evidence-based decision making. Vocabulary skills also improved significantly.

“Because the Spark 101 videos connect abstract content to real applications, they make the math word problems that students typically dislike much less cryptic,” said Susan. “Open questions increased math vocabulary and sentence structure, provided evidence to support a hypothesis, and supported the scientific method of analysis. Even my students with language deficiencies improved due to the increase in math literacy.”

The two videos exposed students to careers in civil, architectural, and chemical engineering, as well as the bio-medical field. As a next step, Susan plans to partner with colleagues in the science department to improve students’ knowledge of robotics using Spark 101 videos.

Pretest and Posttest Outcomes

Texas high school students who participated in Spark 101 lessons, February-March 2014



Survey Results

Pre- and post-surveys of over 500 students in the first research cohort, of which Susan’s class was part, indicated statistically significant increases in student interest in taking more STEM coursework, learning more about STEM coursework and careers by going online, and understanding how STEM coursework relates to their lives.

Most teachers strongly agreed that Spark 101 helped to engage their students in the coursework and improved their problem-solving capabilities, and all teachers requested more Spark 101 STEM videos.

STEM Content Provider Profile

STARS (Science Teacher Access to Resources at Southwestern), the outreach arm of the University of Texas Southwestern Medical Center at Dallas, is a community content provider working with Spark 101 to develop 10 classroom videos about STEM careers.

The first video, designed for high school students and based on a study underway at the medical center, focuses on traumatic brain injury and cognitive impairment and features NFL head-on concussions, a former NFL player, and comparative MRIs.

“Students are not aware of the broad range of jobs in the medical field,” said Stuart Ravnik, the Associate Director of STARS and the Assistant Dean in the Graduate School of Biomedical Sciences. “So our videos identify a larger scientific problem, show how scientists tackle it, and expose students to all the careers around it, in an engaging and interesting way.”

Spark 101 is a program of the 114th Partnership, a nonprofit organization. Spark 101 provides free, real-world resources that help secondary educators motivate students to persist in STEM coursework and careers. www.Spark101.org