Middle School Students Conduct Science Experiments at USU STARS GEAR UP Biotechnology Camp

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GEAR UP biotech camp participants conduct experiments alongside USU students.

Utah middle school students from Sanpete County gained hands-on STEM experience during a two-day Biotech camp in June.

USU STARS GEAR UP has a strong history of working with faculty in the College of Arts & Sciences to offer STEM summer camps to students from GEAR UP partner schools across Utah.
“At the end of the day, it’s our goal to give these students a variety of exposure to new experiences,” said René Hernandez, GEAR UP grant five director.

The camp brought together students from under-resourced schools where they will likely be the first in their families to attend college. For these students, opportunities to explore advanced science topics and have face-to-face time with world-renowned scientists are a rare but critical aspect to shaping their educational and career aspirations.

At the camp, the students learned about galvanization in a new experiment in which they turned copper pennies to shades of silver and gold using zinc sulfate and sodium hydroxide.

“They were comparing whose penny turned the brightest shade of gold,” said Amanda Martin, a biology undergraduate researcher.

Other STEM highlights included a variety of neurobiology lessons from Sara Freeman’s lab, where students held a human brain with eyes still attached.

“Some students were grossed out, and some thought it was so cool,” Hernandez recalled.

They also learned that the body generates electrical signals and explored how modern technology can be used to better understand those signals. Using an electrocardiogram (ECG), students observed how the heart's electrical activity could be measured and even used those signals in experiments to influence each other’s arm movements.

“The experiments were so interesting,” said Aubree Whitman, USU STARS GEAR UP college adviser. “It was so cool to see how engaged the students were,” she said.

The camp was led by Ryan Jackson, an associate professor of biochemistry, with support from biology and biochemistry students. Jackson’s approach was to ensure success for each participant. USU student volunteers worked alongside the middle schoolers, walking them through each step of the experiment, answering questions, and encouraging them to think critically about the results. By building their confidence early on, camp organizers hope the young students will be more likely to envision themselves pursuing a variety of STEM careers.

“There were a lot of girls at this camp, which was exciting because the middle school age is where girls start turning away from science and math,” Hernadez said. “I loved to see them so excited about it.”

One of the highlights of the camp was a laboratory experiment that introduced jellyfish genes into bacteria. The genetic transfer caused the bacteria to glow fluorescent green, blue, or orange, which created an exciting visible result that helped the students better understand to what they were learning. The experiment exposed students to key concepts in modern biology, including gene transfer, gene expression, bacterial immune systems, and CRISPR gene editing technology.

“The students were all really involved this year by asking lots of questions and providing ideas about the experiments,” Martin said.

For these middle school students, the experience was the first time they had worked in a university lab using professional-grade equipment and wearing personal protective equipment.

“It’s fun to see the kids realize they can complete an experiment,” Martin said. “It’s cool to see them take our directions and have them get excited by the results.”

USU STARS GEAR UP is a federally funded grant program at USU that serves students in under-resourced schools throughout urban and rural Utah from seventh grade through their first year of post-secondary education. GEAR UP site coordinators and college advisers help students navigate challenges such as finding programs and applying for federal aid and scholarships, often without a parent or guardian at home who has experience in higher education. Site coordinators and college advisers also organize college visits, tutoring, financial aid nights, and college and career-related tours to benefit the students. USU STARS GEAR UP plans to offer more STEM enrichment opportunities to under-resourced Utah students.