The 2016 Women in Science, Technology, Engineering, and Mathematics (WiSTEM) Institute was held Monday, June 13, 2016 through Friday, June 17, 2016. Twenty two students registered for the week long Institute that is open to high school girls.

WiSTEM is a week of interactive, “hands-on” lab activities relating to the fields of science, technology, engineering, and mathematics (STEM). Students participated in different lab sessions each day and explored the STEM fields found at Sinclair. This year the students discovered the science and technologies involved in space and space exploration.

The labs included the following STEM fields: Automotive Technology, Aviation Technology, Biology, Chemistry, Computer Aided Manufacturing, Electronics Technology, Engineering Technology, Fire Science, Mathematics, and Physics.

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The goals of the WiSTEM Institute are to “fuel” student interest and understanding of STEM fields. Results from end-of-the program questionnaires showed that 100% of the students found sessions to be informative, considered WiSTEM a valuable experience and would recommend the WiSTEM program to friends or family members.

While only 25% of students reported being aware of Sinclair’s STEM programs before participating in WiSTEM, 90% reported an awareness of Sinclair’s programs at the completion of the program. Prior to WiSTEM, only 25% of the girls said they were confident they could handle college and the process of applying for financial aid. After the program, approximately 90% answered that they felt confident.

Students were enthusiastic about their experience at Sinclair and the Institute! Overall, 95% of the students expressed that WiSTEM increased their interest in STEM!
Introduction/Program Summary

The grant funded institute was first established in 1994 as the Women in Engineering Technology (WIET) Institute. Originally, the program was designed to introduce female high school students to the many different areas of engineering technology. In 2008, the Institute was renamed WiSTEM and the focus was shifted to include the many other programs in STEM fields represented at Sinclair. With this shift, the Institute also enhanced the assessment of the program to gauge its effectiveness.

Each year students explore STEM careers and curriculum through ten different blocks of labs under a selected theme. This year’s theme was “Reach for the Stars! The Forces in Space.” Students were introduced to outer space on the first day during the opening ceremony. The lab topics included:

- Automotive-Cars and Satellites
- Aviation Technology-Space the Unmanned Frontier
- Biology-Space and the Evolution of Life
- Chemistry-Raspberry Juice Solar Cells
- Computer Aided Manufacturing-Star Warriors!
- Electronics-Rocket to Space
- Engineering Technology-Balloon Rockets!
- Fire Science-Fire and Space
- Mathematics-Math in Space
- Physics-Gravity Near and Far!

Funding

Funding for the WiSTEM Institute was provided by the Sinclair Board of Trustees and the Science, Mathematics, and Engineering (SME) Division.

An $18,000 budget allows Sinclair to offer the one-week program to a diverse group of high school students recruited from local area schools with only a nominal cost to students’ families (a $10.00 application fee that covers the cost of T-shirts). Students spend 6 hours a day (including lunch) on campus for 5 days participating in the interactive exploration of the STEM fields.

The budget covers lab and classroom supplies, lunches, and marketing. Compensation for faculty and student group leaders/counselors is also covered by these funds.

Did you know?

76% of students successfully completed courses at Sinclair College during the 2015-16 Academic year.

Students work with Biology faculty to learn about the effect of gravity-free environments on muscles.

Students experience flight simulators and flying rescue drones in the Aviation Technology department.

Students get hands-on experience in the Chemistry lab learning how to make Solar Cells from blackberry juice.
Planning, Marketing, and Recruiting

The WiSTEM Committee consists of male and female SME faculty and staff from the different areas of STEM represented at Sinclair.

Each year, committee members meet to discuss possible themes for the Institute. The chosen theme must be relatable to each of the nine participating SME departments. WiSTEM committee members help with marketing the program and recruitment of students from local area high schools. Each department representative is tasked with recruiting fellow faculty to help develop and implement their department’s activity.

Faculty that teach during WiSTEM are compensated for facilitating either a full or half day session.

The target student population is young women entering the 10th, 11th, and 12th grades. WiSTEM faculty contacted area high school teachers and counselors, as well as local area libraries and other STEM related organizations to disseminate WiSTEM applications and reach as many area high school students as possible.

Application forms were also distributed in many of Sinclair’s outreach programs and college fairs in the months leading up to the program. The event was targeted on Sinclair’s website and several participants were reached from that advertising.

Meet the Group Leaders

Sinclair Students

Biotechnology students Delaina Mattaliano and Samantha Gulland and Automotive Technology student Brandi Allen, along with STEM community member Kim Cordonnier came forward to serve as group leaders for the WiSTEM students this year. They enthusiastically led students to sessions and assisted faculty with conducting activities. Their help was invaluable in making sure the WiSTEM students had a positive experience! Thank you to our fantastic Group Leaders for helping to make this a successful WiSTEM Institute!

Did you know?

Founded in 1887, Sinclair is America’s oldest continuously operating community college!

WiSTEM lab sessions were designed to be fun, “hands-on” learning activities to help students experience each STEM field.

Students worked together in teams each day to explore and help each other learn.
Program Opening—The Night Sky

Students and their parents were welcomed by WiSTEM faculty on Monday morning and the Institute began with a visit to Building 8 where students were introduced to the stars by Cheri Adams, Director of Astronomy at the Boonshoft Museum of Discovery. Ms. Adams set up an indoor Star Lab and she gave the students a guided tour through the constellations visible in the night sky. Ms. Adams gave a thrilling demonstration of how the stars appeared to move throughout the night sky and how constellations would vary in appearance depending on the location on earth from which they were viewed.

Automotive-Cars and Satellites

Instructor: Ralph Miller

In the Automotive Technology lab, WiSTEM students learned the significant impact that the space program made on the automotive industry. They shared materials and the adaptation of tools from automotive to space, and vice versa. For example, students learned how tools specifically created to be used in outer space were adapted for use in the automotive industry on Earth. In addition, students explored the technologies derived from and those that rely upon space in new vehicles (GPS, XM radio).

Aviation Technology—Space, the Unmanned Frontier

Instructor: Benjamin Sears

In the Aviation Technology lab, the students learned the science behind Unmanned Aerial Vehicles (UAV) and how they are used both on earth and in outer space! After learning the basics of using the flight simulator, the girls competed with each other to master the flight simulator and complete scavenger hunt missions. Afterwards, they spent time in flight simulators practicing flying the UAVs. The girls really showed their competitive side trying to get the highest flight mission ranking!
Biology—Space and the Evolution of Life

Instructors: Marita Abram, Shiloh Graham, and Erica Mersfelder

In the Biology lab session, students learned about the effects of a zero gravity environment on the muscles, bones and heart in the human body. Students completed a fetal pig dissection to examine these structures. They also discussed other challenges associated with space travel or life in space, potential changes in human bodies microbiome when in space, and the possible evolutionary aspects.

Chemistry—Raspberry Juice Solar Cells

Instructors: Lonnie Dorgan and Jane Myong

In the Chemistry lab, students learned how to use iodine, raspberry juice, titanium oxide, and conductive glass plates to create solar cells. They performed tests to measure the current and voltage flowing through the working solar cell. This session taught students about energy and “green energy.” The lab also introduced the concept of energy transformations, redox reaction, and the use of nanoparticles in science and technology.

More than 3,800 Sinclair students are enrolled at the college through the College Credit Plus program!

The average cumulative Grade Point Average of College Credit Plus students is 3.0
Computer Aided Manufacturing-Star Warriors!

Instructors: Keith Bernheisel and David Griffith

In the Computer Aided Manufacturing lab, the students were taught about how computers are used to direct machining equipment to cut specific patterns in metal. Students helped to create necklaces and/or key chains with “WiSTEM 2016” and “Star Warrior” etched into the metal using the Computer Numerical Control automated equipment. Students were thrilled to be able to take home the necklace or key chain as a souvenir of their session in the CAM lab!

Electronics—Rocket to Space

Instructors: Kenzie Grogean and Tillie Watts-Brown

In the Electronics Engineering Technology lab the students learned the principles of soldering and how electrical circuits function. They discussed the importance of electronics in construction of rockets sent into outer space. Students worked with kits perfecting their soldering skills with the help of faculty.

Students used kits to create a LED rocket to take home. 73% of students soldered the rockets correctly (with some imperfections corrected by faculty); however, 100% of the students received fully functional rockets to take home!

Engineering Technology—Balloon Rockets!

Instructor: Jamshid Moradmand

In the Engineering Technology lab, the students learned about the principles of rocket propulsion. To give the students a better understanding of how rocket circumference influences the speed and distance traveled, they made balloon rockets and measured the distance traveled. Students compared their results and graphed the distance traveled versus the balloon volumes.
Fire Science — Fire and Space

Instructor: Laura Walker

What does it take to propel a rocket into space - Fire! In the Fire Science lab, the girls used a reaction of baking soda and vinegar to create a force strong enough to propel their pasta rockets. Extinguishing a fire is as important as being able to create fire when it comes to space exploration. Students learned about fire safety equipment and had the opportunity to put out a fire.

Mathematics—Math in Space

Instructors: Najat Baji and Kay Cornelius

In the math workshop, students learned about the elliptical shape of space orbitals. Students completed generic ellipse problems and then were given the task of constructing their own ellipse using string and cardboard (to reinforce the geometric definition of the ellipse). Lastly, students found the equation of their created orbital ellipse. Students gained a greater understanding of the important role math plays in designing objects such as satellites that will be in orbit in space.

Physics-Gravity Near and Far!

Instructors: Doug Bradley-Hutchinson, Lori Cutright and Shan Huang

In the Physics lab, students learned about gravity. They discussed questions such as; Would we weigh more or less than we do on earth if we stood on another planet? Why do objects fall to the ground when we drop them? Students also explored the use of GPS systems by using hand held devices to identify and study the path of earth orbiting satellites. The characteristics of gravitational forces were compared to other forces. They also learned about the role of gravity at keeping satellites in orbit around the earth.
Guest Speakers

Learning continued during lunch as guest speakers spoke each day while the students dined. On Monday, the girls met Robin Rucker, Enrollment Coordinator for Sinclair. Ms. Rucker discussed what students should do to prepare for college while they are still in high school (e.g., ACT and SAT) and she supplied the students with a timeline to use as a guide. Ms. Rucker also presented estimated costs for the different types of colleges (private, public 2- and 4-year and for-profit institutions) that showed the students the dramatic cost savings by choosing to start their college career at Sinclair. She then discussed opportunities available for scholarships and financial aid. The session was highly interactive with students asking Ms. Rucker specific questions about their own college plans. Students also had many questions about the financial aid process and how to pay for college. Ms. Rucker provided resources to help them find scholarships for which they could apply.

On Tuesday, Dr. Aurea L. Rivera, of Imagineering Results Analysis Corp., and formerly of National Air and Space Intelligence Center (NASIC) gave the students a fascinating and interactive presentation on Sputnik and the “Space Race.”

Wednesday’s guest speaker, Ms. Carmen Dyer, an Intelligence Analysis Engineer at NASIC brought a panel of speakers from the Miami Valley. Speakers ranged from an engineer to a former Federal Bureau of Investigation agent to a high school science teacher. The panel kept students riveted by their discussions of their experiences working in STEM. Students asked questions about experiences in these diverse fields.

Thursday’s guest speaker was Colleen Costello, Technical Marketing Engineer at Angstron Materials, Inc. in Dayton. Ms Costello captured students’ attention with an interactive discussion about nanotechnology and graphene. Students were amazed to learn of the wide array of applications for this ultra thin layer of carbon in technology.
Closing Program

On Friday, parents, faculty, staff, and Sinclair administrators were invited to an end-of-program banquet. A closing ceremony was held in the Student Activities Center and each student received a certificate of completion and a copy of the group photo. Sandy Specht, WiSTEM Committee Chair, presented a brief overview of the week’s lab activities as families enjoyed the buffet lunch.

Keynote speaker, Representative Rick Perales, a veteran of the United States Air Force and who currently serves in the 73rd House District gave an inspiring talk about the benefits of a degree in the STEM field and the growth of STEM fields in Ohio. Rep. Perales encouraged students to pursue a career in STEM, and cited that “women currently hold only 24% of the jobs in STEM.” He also suggested students apply to his office for summer internship opportunities. Students were thrilled to meet and talk to Rep. Perales and several students plan to pursue an internship in Columbus!

Thank you!

The WiSTEM Institute was made a success due to the efforts of a dedicated WiSTEM Planning Committee: Sandy Specht (Chair), Susan Luken (Outgoing Chair), Marita Abram, Doug Bradley-Hutchison, Kay Cornelius, David Griffith, Larraine Kapka, Monica Martin-Frayne, Ralph Miller, Jamshid Moradmand, Jane Myong, Ben Sears, and Tillie Watts-Brown. There was also support from faculty in each department that developed the lab activities, department chairs, Sinclair staff, and administrators.

Special thanks to the Dean of the SME Division, Tony Ponder, for his support and guidance, and to the Sinclair Board of Trustees for their financial support. Without their help, we would not have been able to offer such an amazing and positive experience for the students!

Future Plans

The WiSTEM Institute can accept up to 32 female high school students. One of our program goals is to begin marketing the program earlier to reach more students and ensure that we enroll the maximum number of students. Throughout the upcoming academic year, we plan to send emails to past participants and create flyers to distribute to local school counselors and teaching staff. WiSTEM Committee members will begin to advertise the event by handing out flyers at college fairs during fall term.

It remains a goal to recruit students whose schools do not have extensive lab facilities so that these students may be exposed to STEM fields and possible career opportunities in STEM. The committee will continue to reach out to local schools in underserved areas.

Did you know?

Sinclair offers over 220 different degree and certificate programs!