2018 WiSTEM Annual Report

Sinclair Community College
Science, Mathematics, and Engineering (SME) Division

2018 Theme: Going Green

The 2018 Women in Science, Technology, Engineering, and Mathematics (WiSTEM) Institute was held Monday, June 18, 2018 through Friday, June 22, 2018. Thirty-three students registered for the week long Institute that is open to high school girls.

The Institute was a week of interactive, “hands-on” lab activities relating to the fields of science, technology, engineering, and mathematics (STEM). Students participated in two interactive lab sessions each day and explored the STEM labs found at Sinclair. This year the students explored the concept of how STEM fields are “Going Green.”

33 female students from 20 area high schools participated in the 2018 WiSTEM Summer Institute. High Schools included:

- Beavercreek HS
- Bethel HS
- Butler Tech Natural Science Center
- Centerville HS
- Dayton Christian HS
- DECA
- Eaton HS
- Emmanuel Christian Academy
- Horizon Science Academy
- Home schooled
- Lakota West HS
- Lebanon HS
- Mason HS
- Miamisburg HS
- Northmont HS
- Stivers School for the Arts
- The Miami Valley School
- Troy HS
- Twin Valley South
- Warren County Career Center
- West Carrollton HS

Highlights from participants’ pre- and post-assessments

The goals of the WiSTEM Institute are to “fuel” student interest and understanding of STEM fields. Results from pre and post program questionnaires indicated that 98% of the students found sessions to be both informative and fun. Over 88% considered WiSTEM a valuable experience and would recommend the program to friends or family members.

While only 54% of students reported being aware of Sinclair’s STEM programs before participating in WiSTEM, 95% reported an awareness of Sinclair’s programs afterwards.

Prior to WiSTEM, 86% of the girls said they were confident they could handle college and 75% expressed confidence in their ability to navigate the process of applying for financial aid. After the program, 100% felt confident.

Overall, 92% of the students expressed that attending WiSTEM increased their interest in STEM!
The grant funded program 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 different areas of engineering technology. In 2008, the Institute was renamed WiSTEM and the focus was shifted to include all areas of STEM represented within the SME division. With this shift, the Institute also enhanced the assessment of the program to gauge its effectiveness.

Each year students explore STEM careers and programs of study through nine different blocks of labs and activities that relate to a central theme. This year’s theme was “Going Green.” The lab topics included:

- Automotive Technology - Green Car Technology/Making your Car Green
- Aviation Technology - Aviation Going Green
- Biology - The Algae’s Always Greener
- Chemistry/Geology - Making Bio-diesel from Waste Cooking Oil
- Computer Aided Manufacturing - Make, Use, Recycle, Repeat
- Electronics Engineering Technology - Catch the Solar Bug
- Energy Management - Wind Life/Heavy Lift
- Mathematics - Exploring Global Warming
- Physics - Green Energy, Blue Panels

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 allowed 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 to cover the cost of t-shirts). Students spent six hours a day for five days participating in the interactive exploration of the STEM fields.

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

“It was amazing getting to meet other girls my age that are into science!”

2018 WiSTEM student

“These young ladies asked so many good questions during my lab. I love working with this group because they are genuinely interested.”

2018 WiSTEM faculty

Students get hands-on experience in the Physics lab testing out solar panels on models they created.

Students fly high in Sinclair’s state-of-the-art Unmanned Aerial Systems (UAS) lab.
Planning, Marketing, and Recruiting

The WiSTEM Committee met throughout the year to determine the central theme and to plan the summer Institute. The committee consists of male and female faculty and staff from nine departments within the SME division.

The departments design their WiSTEM lab activity and relate it to the chosen theme. Each department representative is tasked with recruiting fellow faculty to help develop and facilitate their department’s activity. Faculty must also develop an assessment to determine the effectiveness of the session. WiSTEM committee members assist with the marketing and recruitment of high school students. The target student population is young women entering the 10th, 11th, and 12th grades.

Application forms were available online and they were also distributed at numerous college fairs in the months leading up to the program.

Meet the Group Leaders

Biology student Stephanie Schoenheit, Biotechnology Program graduates Delaina Mattaliano and Shelby Southworth, as well as MVCTC chemistry teacher, Markeata Lee enthusiastically served as group leaders for the WiSTEM students this year. They met the Friday before camp began to navigate the schedule around the campus construction. During the week of WiSTEM, the group leaders led students to lab sessions around the Dayton campus and assisted faculty with activities. Thank you to the outstanding Group Leaders for helping to make this a successful WiSTEM Institute!

Program Opening - Recycling Tower!

Students and their parents were welcomed by WiSTEM faculty and volunteers at the check-in table in Building 3 on Monday morning. Students were given pre-program questionnaires to complete regarding their general attitudes toward college and their knowledge of STEM fields. Students were divided into two groups and the students met their group leaders. The Institute began by student teams competing to build the tallest tower supporting an aluminum can using foil, tape and straws. The goal was to focus the students on recyclable materials as we dove into our Going Green theme!

The application fee covered the costs for students’ WiSTEM t-shirts. WiSTEM lab sessions were designed to be fun, “hands-on” learning activities. Students worked together in teams to explore and help each other learn.
**Automotive Technology - Green Car Technology/ Making Your Car Green**

Instructors: Justin Morgan and Kevin Smith

In the Automotive Technology lab, students got a brief overview of how electric and hybrid cars work. Once in the lab they got a “hands-on” look at energy efficiency in regular gas-powered cars.

Students completed vehicle inspections to evaluate tire pressure, oil level, and air filtration limitations which can effect the fuel use and emissions produced by a car. They also got a chance to change an air filter and a wheel and tire assembly.

The students were excited to go home and test if their family car was environmentally friendly and economically efficient.

**Aviation Technology - Aviation Going Green**

Instructor: Benjamin Sears

In the Aviation Technology lab, the students learned the science behind Unmanned Aerial Systems (UAS) and how they are used to check wind turbines, hydropower dams and other renewable energy equipment.

After learning the basics of using the RealFlight Simulator, the students were asked to complete 10 challenges in which they needed to maneuver a quadrocopter in order to photograph objects. These 10 challenges became progressively more difficult in terms of the number of objects, size, and location.

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 - The Algae’s Always Greener!**

Instructors: Sarah Finch, Erica Mersfelder and Sandy Specht

In the Biology lab session, students learned how carbon dioxide affects global climate change and how ocean algae’s processes of photosynthesis and cellular respiration affect carbon dioxide levels in our atmosphere. The students used spectrophotometers and CO2 indicators to compare the carbon dioxide output of algae kept in dark or light environments over time.

The students also had a chance to study algae under a light microscope and learn more about its life cycle in the ocean. The groups were successful in finding that the carbon dioxide levels decreased in bright light, but actually increased in the dark.
Chemistry - Making Biodiesel from Waste Cooking Oil

Instructors: Jane Myong and Cheryl Thompson

The chemistry workshop had the students working in groups to synthesize biodiesel. They first reviewed the chemistry of biodiesel, the materials and equipment, and the proper safety protocols for synthesizing biodiesel. After removing the by-product, the heat content of the biodiesel was then calculated.

At the end of the experiment about 80% of the students reported consistent heat content for the biodiesel from both the used and unused cooking oil. The students asked insightful questions about biodiesel and most, about 90%, commented that they had learned something new ranging from how to use the lab equipment to synthesizing biodiesel from used cooking oil.

Computer Aided Manufacturing - Make, Use, Recycle, Repeat

Instructors: Keith Bernheisel and David Griffith

In the Computer Aided Manufacturing lab, the students were introduced to computer programs for designing new products. The goal for this session was to find a new and practical way to reuse plastic soda bottles.

The girls were split into teams which researched, brainstormed, designed and presented their finished product to the group. They competed against the other teams for the “best invention design.”

They also learned about the many opportunities in manufacturing and industrial engineering technology at Sinclair.

Electronics Engineering Technology - Catch the Solar Bug

Instructors: Kenzie Grogean and Tillie Watts-Brown

In the Electronics Engineering Technology lab the students soldered together electronic solar powered bugs from kits that, once successfully completed, moved around the table.

Students worked with kits and learned the principles of soldering and how electrical circuits function. All of the students received fully functional electronic bugs to take home.

“I have never used a soldering iron before. I am excited we made something I can show my family!”

2018 WiSTEM student
Energy Management - Wind Lift/Heavy Lift Challenge

**Instructor: Robert Gilbert**

The WiSTEM students learned about wind energy and wind turbines in the Energy Management lab. They saw how the shape and design of a fan blade can effect the amount of wind energy generated by each turbine.

In teams of two, the students created and modified turbine blades to test. Each trial was measured with a voltage meter and the team with the best design, creating the most energy, was the winning team.

Mathematics - Exploring Global Warming

**Instructors: Valerie Cope and Kay Cornelius**

WiSTEM students learned about the statistical methods involved in analyzing the current published data about global climate change. The students then learned to graph data using Excel and created their own scatterplot of the data to draw their own conclusions.

The students then discussed their findings with the class as well as described how they came to their conclusions.

Physics - Green Energy, Blue Panels

**Instructor: Lalitha Locker**

In the Physics lab, students learned about solar energy and the science behind solar panels. They made a small model of a home they were to cool using fans which were powered by three small solar panels. They altered the placement of the panels, design/shape of the home and the sloping of the roof to find the best design to keep their house cool.

Afterwards the students tested their solar energy knowledge with an interactive quiz. Students scored at least 80% correct on all parts of the quiz.

“I really didn’t think I was going to like some of the labs we did, but they were actually really fun! I would recommend this [camp] to anyone”

2018 WiSTEM student
Guest Speakers

Learning continued during lunch as guest speakers spoke each day during lunch. On Monday, the girls met **Allison Foust** from the Office of New Student Enrollment. Ms. Foust 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. Foust 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 also discussed opportunities available for scholarships and financial aid.

The session was highly interactive with students asking Ms. Foust specific questions about their own college plans.

On Tuesday, **Susan Hill**, Senior Research Engineer, came from the University of Dayton Research Institute to discuss her research in mechanical testing. Much of her recent work has focused on the determination of high strain rate effects on material and component properties. Management of several simultaneous programs and contacts with commercial and government agencies is an integral part of her job.

Wednesday’s guest speaker was **Beth Graves**, President of Prime Controls, Inc. Metal Sensing Solutions, which designs and manufactures inspection equipment for machinery in the canmaking, automotive, appliance and other metal forming industries. She told the students about her journey to becoming president of the company and her passion for STEM.

Thursday’s guest speaker was **Keshia Kinney**, Division Manager at Dayton Department of Water Supply and Treatment. She analyzes Dayton drinking water after pumping and treatment to determine the water quality. She talked to the students about her journey to finding a career she loves.

“I loved to hear how these ladies got to where they are today! They are really inspiring”

2018 WiSTEM student

“I didn’t realize there were so many successful science women in Dayton!”

2018 WiSTEM Student
Closing Program Presentations

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. Approximately 100 family members were welcomed by opening remarks from Tony Ponder, Dean of the Science, Math and Engineering (SME) division.

While families enjoyed the buffet lunch, students gave presentations on individual lab sessions and highlighted program and career opportunities, as well as the income potential for each field of study. After the presentations, each student received a certificate of completion and a copy of the group photo.

Faculty members from each participating program were available to answer questions and to receive feedback about their sessions. A SME information table was also available for students interested in a specific SME programs of study.

Thank You!

The WiSTEM Institute was a success due to the efforts of a dedicated WiSTEM Planning Committee: Susan Luken (Chair), Najat Baji (Chair elect), Valerie Cope, Lori Cutright, Eric Dunn, Sarah Finch, Bob Gilbert, David Griffith, Monica Martin-Frayne, Ralph Miller, Ben Sears, Cheryl Thompson and Tillie Watts-Brown. There was also support from the faculty in each department that developed the lab activities, department chairs, Sinclair staff and administrators.

Special thanks to both the SME Dean, Tony Ponder, and the SME Assistant Dean, Eric Dunn, for their 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 a positive educational experience for the students!

Future Plans

One of our WiSTEM program goals is to begin marketing the program earlier to reach more students. We plan to put the 2019 WiSTEM Institute application online in Fall Semester. Throughout the upcoming academic year, we plan to send emails to past participants, utilize social media and create flyers to distribute to local school counselors and teaching staff. SME will also advertise the event by handing out flyers at college fairs throughout the year.

It remains a central goal to recruit students whose schools do not have extensive lab facilities so 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.