2011 WiSTEM

Annual Report

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Submitted to:
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2011 Annual Report

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Introduction

The 18th annual Women in Science, Technology, Engineering and Mathematics (WiSTEM) Institute was held June 13-17, 2011 at Sinclair Community College. The Institute is designed to allow young women to explore career opportunities in science, technology, engineering and mathematics.

The Women in Engineering Technology (WIET) institute was established in 1994 when a grant was acquired to enable females in grades 10-12 to explore the different areas of engineering technologies. In 2008, the Institute was renamed WiSTEM and focused on being more academically oriented and assessment driven, while the topics were expanded to include all areas of STEM that are represented at Sinclair.

Since the grant's inception, the summer institute has been directed by the following faculty and staff:

- 1994: Harmit Kaur, Professor, Electronics Engineering Technology
- 1995-2007: Natalie Royer, Adjunct Faculty & CNC Machine Lab Technician, Computer Aided Manufacturing
- 2008-2009: Larraine Kapka, Associate Professor and Chairperson, Engineering Technology Design
- 2010: Kay Cornelius, Associate Professor, Mathematics
- 2011: Deborah Shuler, Adjunct Faculty, SCC

The 2011 program used the theme "Feed the World, Food For Thought." Ten different technical blocks of instruction explored connections to food and how the various STEM-related career fields such as aviation, biology, chemistry, physics, engineering, environmental and others play a part in production, safety and distribution of the world food supply. This year, the Institute included guest speakers that offered food related presentations.

Funding

Funding for the 2011 WiSTEM Institute was provided by a Sinclair Board Designated Endowment Fund and the Science, Mathematics and Engineering (SME) division. A $25,000 budget allowed Sinclair to offer the one-week program to the diverse group of students. An additional $1,000 was contributed by the Vectren Foundation. A nominal $10.00 application fee was the only cost to the students.

The budget covered lab materials, lunches, classroom supplies, parking passes, duplication, mailing, and marketing. Compensation for faculty, staff, and student counselors also came from this budget.

Planning & Recruiting

The WiSTEM Committee consists of female faculty and staff drawn from all areas of the SME division, as well as Computer Information Systems, Academic Foundations, and Psychology. Committee members determine the Institute theme and structure, help with marketing and recruitment, develop the Institute activities and implement the program. Individual faculty and staff members were paid for specific hours of teaching at the Institute, but not for planning or lesson plan development prior to the event.

For 2011 recruitment, the target student population was restricted to young women entering the 10th, 11th and 12th grades. High school teachers and other organizations received WiSTEM applications. A total of 48 applications were received, but only 36 students were accepted due to lab size restrictions. The program was well publicized and this increased the number of applicants this year.

The participants were divided into two groups, with each group assigned a student counselor who was a Sinclair or University of Dayton student with a STEM major. Counselors kept track of their students and made sure they moved safely around campus between activities. Participants filled out a detailed survey at the end of the program, which included questions on what they thought of the Institute in general as well as specific activities.

Marketing

Starting in late 2010, WiSTEM flyers and applications were distributed at various community high school and college events, such as the Miami Valley Tech Prep Consortium and the Summer Camp Fair at Wright State University. Informational letters describing WiSTEM and encouraging interested students to apply were sent to approximately 350 individual teachers at 45 high schools in the Dayton area.

Lab Activities

Program

The Institute started on June 13th with opening remarks by Deborah Shuler and a welcome at lunch time from Science, Mathematics and Engineering assistant dean, Surinder Jain.

For the 2011 program, 10 different labs explored the food connection throughout the many areas of STEM. Each block of instruction had a lesson plan designed to ensure that key concepts were covered. Associated labs allowed the participants to better appreciate the principles covered in the lecture material. A copy of the lesson plan format is included in Attachment A.

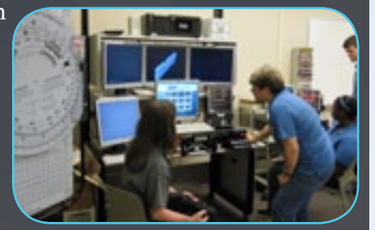
Sinclair faculty and staff were responsible for conducting all of the sessions. Selected instructional blocks included a five question written assessment of the main points covered in the instructional block.

WiSTEM student counselors were Hannah Bennett, a Sinclair automation and control w/ robotics technology major, Jasmin Evergin, a Sinclair architectural technology major, and Hadil Issa, a University of Dayton chemical engineering major. They served as guides and mentors and took the participants to each activity. Other duties included general supervision, taking attendance and distributing meal tickets and parking passes.

Aviation Technology

Instructors: ***Donna Hanshew, Don Stark & David Haase***

Aviation faculty gave a short introduction to the program and the types of degrees and certificates offered. The term "food miles" was explained to the students. Food miles is a term which refers to the distance food is transported from the time of production until it reaches the consumer. On average, food travels between 1,500 to 2,500 miles every time it is delivered to the consumer. The girls learned about how air transportation plays a role in transporting fruits and vegetables. They also learned how pilots navigate and some of the differences in flying in other countries versus the United States.



All of the girls were able to fly the desktop flight simulators as well as the GAT-II. After the aviation session, two of the girls scheduled an introductory flight in the training aircraft.

Biology

Instructors: ***Susan Luken & Norma Hollebeke***

Young women from the Dayton region were engaged in learning about genetically modified foods and acquired hands on experience in the biotechnology lab. Taking advantage of the universal magnitude of the genetic code, scientists have succeeded to associate DNA sequences coming from different organisms using molecular biology techniques and to integrate foreign DNA into plants. In this lab experience, the participants identified GMO (genetically modified organisms) samples through the method of PCR (polymerase chain reaction) and gel electrophoresis. They also learned about the benefits and potential harm of these organisms.

Chemistry

Instructors: ***Jane Myong, Kay Cornelius & Ed Gallo***

The goal of this lab was to show the students how to determine the calorie content of foods. The food items used were different nuts and popcorn. The peanut was the standard nut for everyone. Upon completion of the experiment with the peanut, they performed a second experiment with a nut of their choice (or popcorn). After collecting the data, they calculated the energy content of the food and graphed the combined class result. Their results were analyzed and compared with the calorie contents provided in the nutritional information labels. The students also performed a third experiment with their own modified setups to reduce the errors. The evaluation of the sessions showed that the students enjoyed burning food items during the lab but didn't like the calculation part of the experiment.

Computer Aided Manufacturing

Instructors: ***Natalie Royer & Daryl Curnutte***

In the Computer Aided Manufacturing area, students visited the Computer Numerical Control (CNC) Lab. They learned about machine safety, how CNC machines are based on the Cartesian coordinate system, and how CNC machines are at the heart of manufacturing.

Many food preparation products are produced on CNC machines. Examples are industrial mixers and baking equipment as well as the molds that are used for plastic utensils. The activity in the CNC lab had each student machine a personalized name plate that they were able to take home with them.

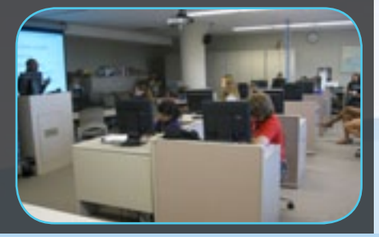
Culinary

Instructor: ***Derek Allen***

When the students first arrived they took a pre-test on Time-Temperatures and Food-borne illnesses associated with certain foods. They were allowed to be in teams of 3 or 4. The scores were low and some answers were blank. The following topics were covered during the session:

1. The importance of preventing Time-Temperature Abuse
2. The importance of preventing Cross-Contamination
3. The importance of Proper Hygiene
4. Foods and Common Illnesses
5. The difference between Bacteria, Viruses, Fungi, and Parasites
6. Minimum cooking temperatures and times to prevent harmful microbial growth on food
7. How to thaw foods properly
8. How to cool foods properly

At the end of the session, the students completed the same quiz which had to be taken individually this time and everyone scored between 90% - 100%. The students also received some handouts. Everyone, including the instructor, had fun and enjoyed the session.



Lab Activities

Dietetics

Instructor: ***Nora Schaefer***

The Nutritional Management and Dietetics demonstration explored four areas of the field demonstrating how to become a nutritional expert. In the area of medical nutrition therapy, students calculated a tube feeding diet prescription and discovered the concept of carbohydrate counting for diabetic clients. Addressing wellness and fitness, students calculated body mass index and grams of fat and sugar contained in various snacks and beverages. Exploring food service management, students investigated thickening agents and discovered how to change thin liquids into nectar and honey thick consistencies for use with clients with dysphagia (swallowing difficulty). In community nutrition, students delved into a lesson plan titled "How rich is my calcium bank?" Each student assessed their calcium needs, how to achieve peak bone mass and the milligrams of calcium contained in various dairy products.

Electronics

Instructors: ***Tillie Watts, Abdullah Johnson & Kenzie Grogean***

To keep with the theme, "Feed the World, Food For Thought," The EET Department decided to assemble kitchen timers as the project for WiSTEM. The project helped the students with component recognition, soldering skills and printed circuit board assembly. The project gave the girls a window into electronics by providing a fun way to learn. The girls now have a useful project and a wonderful sense of accomplishment in engineering.

Environmental

Instructors: ***Serenity-Joy Wolf & Ja'net Graham***

The environmental engineering lab started with a brief discussion of what environmental engineering includes and then the scope was narrowed specifically to water quality. The activity tied water quality into the WiSTEM theme of food and talked about agricultural practices, specifically the use of nitrogen and phosphorus rich fertilizers. These fertilizers act as diffuse contaminants when storm water transports the nitrogen and phosphorus contained in the fertilizers to the bodies of water. Nitrogen and phosphorus are key components to eutrophication, which results in reduced dissolved oxygen levels and, therefore, reduced biodiversity. To make the theoretical discussions "real," the students and instructors went down to the river and actually conducted field tests for dissolved oxygen, phosphate, and nitrate in the local river water.

Physics

Instructors: ***Shan Huang, Lalitha Locker & Lori Cutright***

The focus of the "Physics Behind Refrigeration" workshop was to investigate ways to preserve food by refrigeration so that it can be distributed across the country or worldwide without compromising the quality of the food. The participants were introduced to innovative ways of keeping food cold, the physical principles of the functioning of a modern refrigerator, and the history of the invention of thermometers through the use of a few short video clips. They also investigated factors that affect the freezing and boiling point of water by engaging in short, hands-on activities and demos. Students had to design and build a "refrigerator" out of common household materials like Styrofoam cups, aluminum foil, bubble wrap etc. to keep a cup of ice cream cold for a certain interval of time. The group that kept the ice cream the coldest at the end of the time interval was the "winner."

Quality Engineering
More than just a "KISS" for Quality!

Instructor: ***Sandy Feola***

The quality engineering demonstration introduced several quality engineering topics using chocolate. A large bag of Hershey KISSES® provided a statistical sample so teams could weigh and measure the height and diameter of the individual candies using electronic weigh scales and digital calipers. The students found out that not every piece of candy meets the expected product specifications listed on the bag. The group watched a short video that explained chocolate production starting at the cocoa trees through the KISSES® chocolate extrusion process. Data collection and analysis helped evaluate product characteristics and packaging. After charting all of the data in a computer SPC (statistical process control) program, the students did not forget the final taste test to determine customer satisfaction!

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Other Activities

Lunch Hour Professional Presentations

SCC Safety

Presenter: ***Mary Donofrio, Sinclair Public Safety, Police Officer***
Officer Donofrio explained safety issues on campus and provided information about contacting campus police for various situations that may arise for students.

Nanotechnology

Presenter: ***Heather Brooks, Buckeye Composites, Nanocomposite Engineer***
Ms. Brooks provided information about her education, career choice, employment and the field of nanotechnology. PowerPoint slides and actual sample materials offered more details about nanotechnology.

Locally Grown Food

Presenter: ***Ron Williams, Dorothy Lane Market, Local Foods Manager***
Mr. Williams offered an explanation of locally grown foods and their nutritional benefits. He had slides that provided background information and then he surprised the students with fresh fruit and brownies from Dorothy Lane Market.

Academics

Presenter: ***Karen Blake, Sinclair Academic Advising Center, Senior Academic Advisor***
Ms. Blake spoke to the students about the difference between an associate degree and a bachelor's degree in technology and science fields. She provided information sheets with the degree programs in the Science, Mathematics and Engineering division and encouraged students to seek advice on programs if they attend Sinclair Community College in the future.

Food Bank

Presenter: ***Rosemary Dannin, The Food Bank, Resource Development Manager***
Ms. Dannin shared statistics regarding the need for food distribution in our community. People that are unemployed, low income or disadvantaged in other ways often need supplemental food. The Food Bank provides a valuable service to distribution sites throughout the region. Ms. Dannin showed a presentation that demonstrated the food needs in our community. As a bonus for the students, she passed out reusable grocery bags with The Food Bank logo.

Bread for the World

Presenter: ***Glen Bengson, Bread for the World, Volunteer Spokesperson***
Mr. Bengson distributed informative pamphlets about the organization called Bread for the World. They are a non-profit group that advocates for ending world hunger. They do not distribute food, but the organization works to influence public policy and support change that can help to end world hunger.

Admissions

Presenter: ***Ted Sampson, Sinclair Admissions/Recruitment, Admissions Counselor***
Mr. Sampson met with both groups of students on Thursday during the WiSTEM Institute to explain the admissions process at Sinclair. The Admissions Office provided packets of information and Sinclair backpacks for all of the students.

Other Activities

Closing Program

Deborah Shuler, 2011 WiSTEM project director, presented certificates of participation to each student. Following the certificates and photos, a drawing was held for small promotional prizes. The highlight of the closing event was the "Chemistry of Ice Cream;" an activity planned and executed by chemistry professor Jane Myong. Students were able to watch or assist in the process and then everyone enjoyed eating the ice cream. Before leaving, the students were asked to complete a WiSTEM evaluation questionnaire (Attachment C).

Conclusion

Hands-on experiments and projects, some made to take home, provided the students a multifaceted opportunity to learn about the importance of STEM careers. In the WiSTEM program, typically there are two kinds of students: those who know they want to enter a STEM field, but are not sure what discipline they would enjoy, and others who are not sure what STEM entails. Whether or not a student chooses a STEM field as a career, the Institute participants gained an understanding of careers and terminology that will help them throughout their lives. Students also increased their confidence in their ability to solve problems and learn new things.

Thank You!

The dedication of many people is required in order to make the WiSTEM Institute happen. Department chairs, faculty, staff, administrators, Sinclair students, parents, and the high school students all strive to make the program an enjoyable and rewarding event. Many thanks are extended to the Sinclair Board of Trustees; the Science, Mathematics and Engineering division; Dr. Roger Abernathy, dean of the Science, Mathematics and Engineering; Surinder Jain, assistant dean, Science, Mathematics and Engineering; the WiSTEM committee; faculty and staff who facilitated the laboratory workshops and experiments; college student counselors, as well as those who worked behind the scenes before, during, and after the Institute. Thanks are also extended to the high school teachers and counselors who participated in recruitment, Sinclair Publications, Sinclair Admissions, Student Activities, Campus Police, and Aramark Food Service. A special thank you goes to Carey Brown, Biology department and Monica Martin-Frayne, SME Dean's office, who both provided administrative support. Appreciation also goes to Nora Adams, Melinda Adams, Shan Huang, Natalie Royer and Jessica Sira for photographs.

Future Recommendations

The 2011 WiSTEM Institute was a success and recruitment was not an issue this year. In fact, we had a wait list and many calls and emails had to be answered with the news that the Institute quota of 36 students had been met. Only one student failed to attend due to a family problem so our final attendance was 35 students. The WiSTEM committee recognizes that during the 18 years this program has been in existence, the Dayton area's demographics and summer opportunities for high school students have changed significantly. Efficient and effective marketing will always play a significant role and the committee cannot take the 2011 attendance for granted. It is important to have a continuous process of exploring promising ways to reach and recruit the target audience, as well as adding the most effective formats for the Institute itself. A successful WiSTEM Institute is the best marketing tool because word of mouth is a powerful force for recruiting in future years.

2011 WiSTEM photos can be viewed at *www.sinclair.edu/organizations/wistem*

Forms

Lesson Plan Format

WiSTEM Lesson Plan for_____

Lesson objectives:

Outline of Lesson Topics:

1) Introduce instructors and background
2) Introduce topic and tie to current theme
3) List main ideas to be covered:
    a.
    b.
    c.
4) Summarize main points of lesson
5) Complete assessment tool

Hands-on Activities:

Required Materials or Lab Equipment:

Other:

Attach five assessment questions for your material (T/F. M/C, matching, etc.)

WiSTEM 2011

Group A

	Monday June 13	**Tuesday** June 14	**Wednesday** June 15	**Thursday** June 16	**Friday** June 17
9:00 am- 11:30 am	**Chemistry** Jane Myong Kay Cornelius Ed Gallo **Room 12-343**	**Physics** Shan Huang Lori Cutright Lalitha Locker **Room 4-213**	**Biology** Susan Luken Norma Hollebeke **Room 3-033**	**Quality/Industrial Engineering** Sandy Feola **Room 13-104** **Admissions** **Ted Sampson** **11:10**	**Culinary- 9:15** Derek Allen **Room 13-406** **Dietetics- 10:20** Nora Schaefer **Room 13-422**
11:30 am- 12:00 pm 12:10 pm 12:30 pm	**Lunch** **Bldg. 8** **Student Activities** **Presentation** SCC Safety Officer Mary Donofrio **WiSTEM shirts**	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Nanotechnology Heather Brooks	**Lunch** **Bldg. 8** **Student Activities** **Presentation** Organic/Local Food Ron Williams	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Food Bank Rosemary Dannin Acad. Advising Karen Blake	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Bread for the World Glen Bengson
12:30 pm- 3:00 pm	**Computer Aided Mfg.** Natalie Royer Daryl Curnutte **Room 11-141** **Wear sneakers and WiSTEM shirt on Tues.!**	**Environmental** Serenity Wolf Ja'net Graham **Room 20-142**	**Aviation** Donna Hanshew Don Stark David Haase **Room 13-106**	**Electronics** Tillie Watts Abdullah Johnson Kenzie Grogean **Room 1-223**	**Student Certificate Presentations** Deborah Shuler **"The Chemistry of Ice Cream"—** Jane Myong

WiSTEM 2011

Group B

	Monday June 13	**Tuesday** June 14	**Wednesday** June 15	**Thursday** June 16	**Friday** June 17
9:00 am- 11:30 am	**Computer Aided Mfg.** Natalie Royer Daryl Curnutte **Room 11-141**	**Environmental** Serenity Wolf Ja'net Graham **Room 20-142**	**Aviation** Donna Hanshew Don Stark David Haase **Room 13-106**	**Electronics** Tillie Watts Abdullah Johnson Kenzie Grogean **Room 1-223**	**Dietetics-9:15** Nora Schaefer **Room 13-422** **Culinary-10:20** Derek Allen **Room 13-406**
11:30 am- 12:00 pm 12:10 pm 12:30 pm	**Lunch** **Bldg. 8** **Student Activities** **Presentation** SCC Safety Officer Mary Donofrio WiSTEM shirts	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Nanotechnology Heather Brooks	**Lunch** **Bldg. 8** **Student Activities** **Presentation** Organic/Local Food Ron Williams	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Food Bank Rosemary Dannin Acad. Advising Karen Blake	**Lunch** **Bldg. 8** **Student Act.** **Presentation** Bread for the World Glen Bengson
12:30 pm- 3:00 pm	**Chemistry** Jane Myong Kay Cornelius Ed Gallo **Room 12-343** **Wear sneakers and WiSTEM shirt on Tues.!**	**Physics** Shan Huang Lori Cutright Lalitha Locker **Room 4-213**	**Biology** Susan Luken Norma Hollebeke **Room 3-033**	**Quality/Industrial** Engineering Sandy Feola **Room 13-104** **Admissions** **Ted Sampson** **2:40**	**Student Certificate Presentations** Deborah Shuler **"The Chemistry of Ice Cream"—** Jane Myong

Summary of Responses
2011 WiSTEM Institute
Post-Assessment

N = 35

Please answer the following questions using the scale shown.

For the following 2 questions, select the best answer from those listed to the right	I have never heard of this, have no idea about this	Have heard of this, know nothing about it	I know a little about this	I have a pretty good idea about this	I know all about this
What is the difference between Engineering and Engineering Technology?	3	8	10	14	1
What is the difference between a two year engineering technology degree and a four-year engineering technology degree?	2	2	16	12	2

Select the best answer for the following questions	Definitely disagree	Somewhat disagree	Undecided	Somewhat agree	Definitely agree
After attending this institute, I am more confident that I can handle college.	0	3	1	16	15
I am planning on attending college.	0	0	2	4	28
I am interested in earning a 2-year degree.	4	4	11	5	8
I want to earn a 4-year degree.	0	0	3	5	23
I am interested in a career in a STEM field.	3	0	9	12	9
I am familiar with Sinclair Community College.	2	3	2	14	15
I want to go to college close to home.	2	6	16	5	6
I want to live at home for part or all of my college experience.	10	7	13	2	3
I want to live on campus during college.	2	0	12	10	11
I expect to pay for most or all of my college education myself.	3	5	15	6	4
I already know where I want to go to college.	4	5	16	7	3
I will require substantial financial aid and student loans to be able to afford to go to college.	2	6	17	8	3
Financial considerations will require me to attend a community college for my first two years of college.	10	8	13	3	1
I am considering attending Sinclair Community College for my first year or two of college.	9	5	15	2	4

[TURN OVER AND COMPLETE THE REMAINING QUESTIONS ON THE BACK]

Select the best answer for the following questions.	Definitely not	Probably not	Undecided	Probably	Definitely
I have learned a lot at this Institute.	0	3	2	12	18
Because of this institute, I am considering a STEM career.	2	2	14	9	8
I thought that the individual sessions of this Institute were very informative.	0	3	5	16	11
I thought that the activities we did during the Institute were fun.	1	1	1	16	16
I would attend this Institute again next year if I am still eligible (different overall theme and projects).	0	1	6	9	17
I would recommend this Institute to a friend or younger sister.	1	3	3	9	19

Please rate the sessions listed below	Very poor	Poor	Average	Very Good	Excellent
Lunch Time Presentations	1	2	18	12	2
Quality of Faculty and staff	0	0	5	12	18
Overall Institute	0	0	6	16	13

Select the best answer for this question	I wanted to attend	Parent made me attend
How did you feel about coming to WiSTEM?	31	4

Forms


2011 WiSTEM