

WOMEN IN ACTION SUMMER PROGRAM

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As the state's oldest land-grant institution, Mississippi State University has historically been associated with activities focused on improving the lives of Mississippi's citizens through research, education, and service. Outreach activities in the MSU College of Engineering generally and consistently have focused on grades 7 through 12.

In 1994, Mississippi State's College of Engineering piloted a program called Women in Action Summer Program to introduce rising seventh and eighth grade female students to the fields of engineering. A major goal of the program is to encourage these young women to consider engineering as a career and adequate time to prepare for college classes.

Since the beginning of this pilot program, the MSU chapter of Society of Women in Engineering (SWE) has spearheaded the camp—from planning schedules, selecting participants, overseeing each activity, to checking out at the end of camp. Initially the program was limited to one session per summer with 25 participants. In 1995, this program was increased to two camps per summer with 30 participants. Directors at MSU have had to turn away as many as 60 applicants; consequently, during the summer of 2000, there will be three camps per summer scheduled.

In preparing for the summer programs, the SWE members and leaders interview university students to serve as mentors and counselors. Interviewers include the program coordinator, SWE's advisor, and the Outreach Coordinator for the MSU College of Engineering. Any camp on campus is required by Mississippi State's housing regulations to have at least one counselor for every 10 participants in the dormitories assigned for summer programs.

SWE sends applications to every middle school in the State of Mississippi; SWE members rank each application received. Ranking criteria include applicant's GPA, teacher recommendations, mathematics- and science-related activities and awards, and a brief personal narrative on why the applicant would like to attend the Engineering camp at Mississippi State University. All accepted SWE program participants receive an acceptance letter, a form for insurance, a list of items to bring to the camp, and instructions on where to send a nominal \$30.

The program begins on a Thursday and ends before noon on Sunday. Participants check into the dormitory between 2 and 4 p.m. At a 4 o'clock opening session, the vice

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president of SWE introduces to the participants all camp counselors and advisors. Policies, rules, and regulations are discussed.

Participants are asked to complete a pre-survey, daily evaluation, and post-survey. From the surveys and evaluations, leaders read comments and suggestions to learn how to improve program activities. SWE advisors and members strive to improve the program by implementing and developing new activities incorporated with proven successful activities.

Projects are conducted by engineering professors and SWE members at Mississippi State. The first project is on waste minimization and the concepts of recycling¹ and is presented by a professor from the Chemical Engineering Department at MSU. The professor uses Play-doh® and the Play-doh Fun Factory® to demonstrate various aspects of waste management. The future engineers have to cut certain shapes and lengths from different colors of Play-doh®; these shapes and lengths represent different types of waste. Campers are responsible for keeping colors separated. This project illustrates the concept of waste and by-products emitted from production, and it demonstrates it is not easy to separate products after they are mixed.

The second camp project is building bridges. The participants use toothpicks, marshmallows, and modeling clay to design and build individual bridges. The learning activities are concluded with the bridge project, then the participants return to their rooms to complete a daily evaluation.

Friday's activities consist of tours of engineering departments at MSU. The Aerospace Engineering faculty members explain the concepts of the Wind Tunnel, which is used to test wind resistance on objects such as grapevines and cables. They also demonstrate testing similar to that used on baseball-bat materials. The Electrical Engineering faculty opens up the High Voltage Laboratory that demonstrates how lightning occurs. The Computer Engineering Department at the Engineering Research Center (ERC) shows the campers the Virtual Reality Cave. After touring the departments and visiting with the faculty, these young campers return to their bridge-building projects.

The last activity of the day is the Team Boat-Building Competition.² Friday night the participants are divided into teams of five members each. They are provided with the rules, details and instructions on the competition. Each team is given \$50 allotment to be used on materials for building and decorating their boats. Each team has to name its boat, give an informal presentation on why and how they named and designed their entries, and how the boat propels itself across a 5-foot child's plastic wading pool. Each boat is given a buoyancy test to determine how much weight it can hold before it sinks. The projects are graded based on the competition's objectives; winners are awarded first, second, and third place ribbons at the banquet. At the end of the day, the participants once again complete a daily evaluation.

Saturday wake-up call is 7 a.m., with breakfast following. After breakfast, campers return to a classroom for an Ergonomics project involving cake decorating.³ The future engineers are divided into groups of five, with each team member assigned a part in decorating a cake. Each team uses a different sized bowl with icing and a different sized spatula to accomplish the same objectives. The campers have 10 minutes to complete each objective; their actions and the position each team member takes while completing her assigned task are videotaped. (The girls stand, kneel in chairs, and some almost stand on their heads to complete the objectives.)

Campers view the videos and are informed about backaches that can occur from standing in a position for 8 hours or why hands are hurting from holding items too long a time. Explaining that having the correct tools for a job, proper table heights, and spatula size can make completing a project easy or hard, and painless or painful reinforces ergonomic principles.

The campers are introduced to the next activity, which is called Polypopagons⁴ to teach them about production and quality control of products. Each girl makes her own Polypopagons from a set of step-by-step instructions. Then the girls are put in five groups, with six people per group, and each girl is assigned a job in constructing the Polypopagons. Each group is given a stack of 6-inch by 10.5 inch, 54- to 64-pound card stock, clear adhesive tape, measuring rules, pencils, and number 19 rubber bands. The groups have 15 minutes to make as many Polypopagons as possible. After time limit expires, the project leader checks each group's quality control on products.

The final MSU activity of the summer program is Fun With Chemistry, a project where the young campers make "Gluep." This activity demonstrates how mixing certain chemicals with different textures can transform a liquid into a solid state. At the end of the day, the participants once again complete a daily evaluation.

The summer program concludes with an awards banquet on Saturday night. Winners of the camp's competitive events are recognized and presented with medals. The Most Enthusiastic Participant, as voted by the counselors, is recognized with a plaque. The participants vote on their favorite camp counselor, who is also recognized at the banquet with a gift. Each camper receives a certificate of participation.

On Sunday morning, participants check out after a farewell presentation for their parents, who are given a presentation on the activities their daughters completed during Women in Engineering Program at MSU. Dr. Wayne Bennett, Dean of the College of Engineering at MSU, addresses parents and campers in a question and answer session about the university's engineering programs. This session concludes the program.

In future camp activities, parents will be guests at the awards banquet. Because rising seventh and eighth graders participate in these engineering programs, a follow-up weekend will be planned in the spring semester of their tenth and eleventh grade year, to again encourage them to pursue a career in engineering.

Bibliography

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- [2] Dr. Lesia Crumpton, Associate Professor, Department of Industrial Engineering, Mississippi State University, Box 9544, Mississippi State, MS 39762
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- [4] Ms. Mary Jasper, Associate Professor, Department of Industrial Engineering, Mississippi State University, Box 9542, Mississippi State, MS 39762
- [5] Sarquis, M, and Sarquis J. (1993). Fun with Chemistry: Volume 2. Madison: Institute for Chemical Education, University of Wisconsin-Madison.