CENTER FOR PRE-COLLEGE OUTREACH

2016 Annual Report

mtu.edu/precollege

Michigan Technological University

2016 ANNUAL REPORT

The Critical Space Called Pre-College Outreach

Philosopher Herbert Spencer once penned, "The great aim of education is not knowledge, but action." A knowledge-based economy requires adept students. Developing knowledge and crafting the foundation for ability in science, technology, engineering, and math should begin prior to postsecondary education. Yet middle and high school educators often find themselves consigned to a system rooted in measurement: graded assignments, quizzes, and standardized tests. They're left unable to provide hands-on experiences that put knowledge into practice. Critical learning happens through trial, error, and curiosity—and there's often little time or resources for that in the traditional classroom.

This is a problem.

At Michigan Technological University, we recognize the value of pre-college outreach and its impact on youth. Action-based learning is a pillar of our mission. The scope and range of our outreach is vast: faculty-led activities funded through the National Science Foundation, programming hosted by the Center for Science and Environmental Outreach, the Advanced Power Systems Mobile Lab, Summer Youth Programs, and Mind Trekkers (just to name a few). Annually, our pre-college events, programming, and activities reach more than 75,000 local, domestic, and international students. We catalyze partnerships with industry and foundations, mobilizing volunteers and connecting opportunities with results. And we do it because it's vital.

Programming offered through Michigan Tech's Center for Pre-College Outreach immerses the senses in educational experiences that, in many cases, cannot be accessed anywhere else. Investment in authentic learning through exploration bucks the precedent; at our institution, teaching and learning are as important as outreach. Unconventional. Nontraditional.

This report shows data and highlights reflecting the impact of the Center for Pre-College Outreach initiatives in 2016. We are proud of these efforts and their outcomes, and we look forward to doing it again in 2017!

Thank you for your support,

Cody Kangas
Director, Center for Pre-College Outreach
Michigan Technological University

Our Impact

16

MIND TREKKERS EVENTS

49

TOTAL SUMMER YOUTH PROGRAM COURSES

416,905*

TOTAL OUTREACH PARTICIPANTS IN 2016

*Total number of SYP, Mind Trekkers, and College Access participants

Government, industry, the non-profit community, and educational institutions agree—our country must develop a sustainable system for human capital equipped with expertise in science, technology, engineering, and mathematics (STEM). The best way to increase STEM interest and competence?

Spark a sense of wonder—reach youth in their formative years.

Our programs invite students from across the United States and abroad to dive into STEM—intentionally and purposefully. Our College Access programs offer project-based experiences for local youth in schools and on campus. Summer Youth Programs (SYP) provide a platform for more than 1,000 students from around the world to immerse themselves in future career paths. Mind Trekkers, our mobile roadshow, showcases STEM in action for thousands of people.

These programs introduce youth to the fundamentals of STEM—inspiring them to become scientists, mathematicians, and engineers. Many SYP students go on to Michigan Tech where they continue their STEM education.

TOTAL SYP ALUMNI ON CAMPUS:

679
students

9%
of student body

59%
increase over 5 years

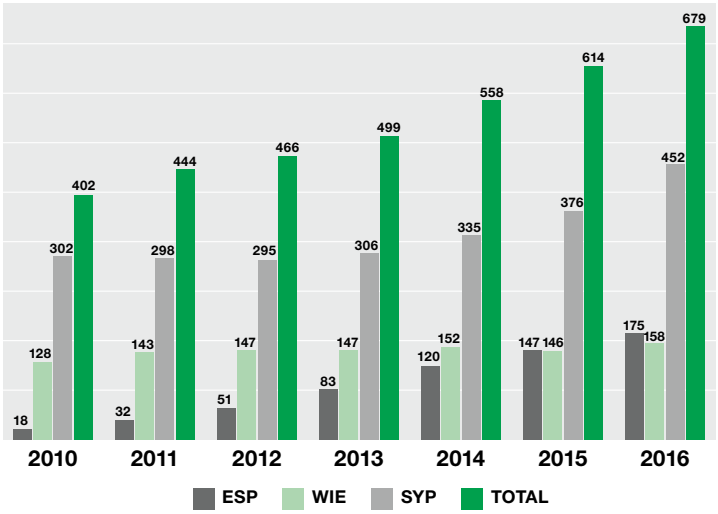
94%
majoring in STEM fields

277
are female students

80%
call Michigan home

23%
enrolled in Mechanical Engineering-Engineering Mechanics

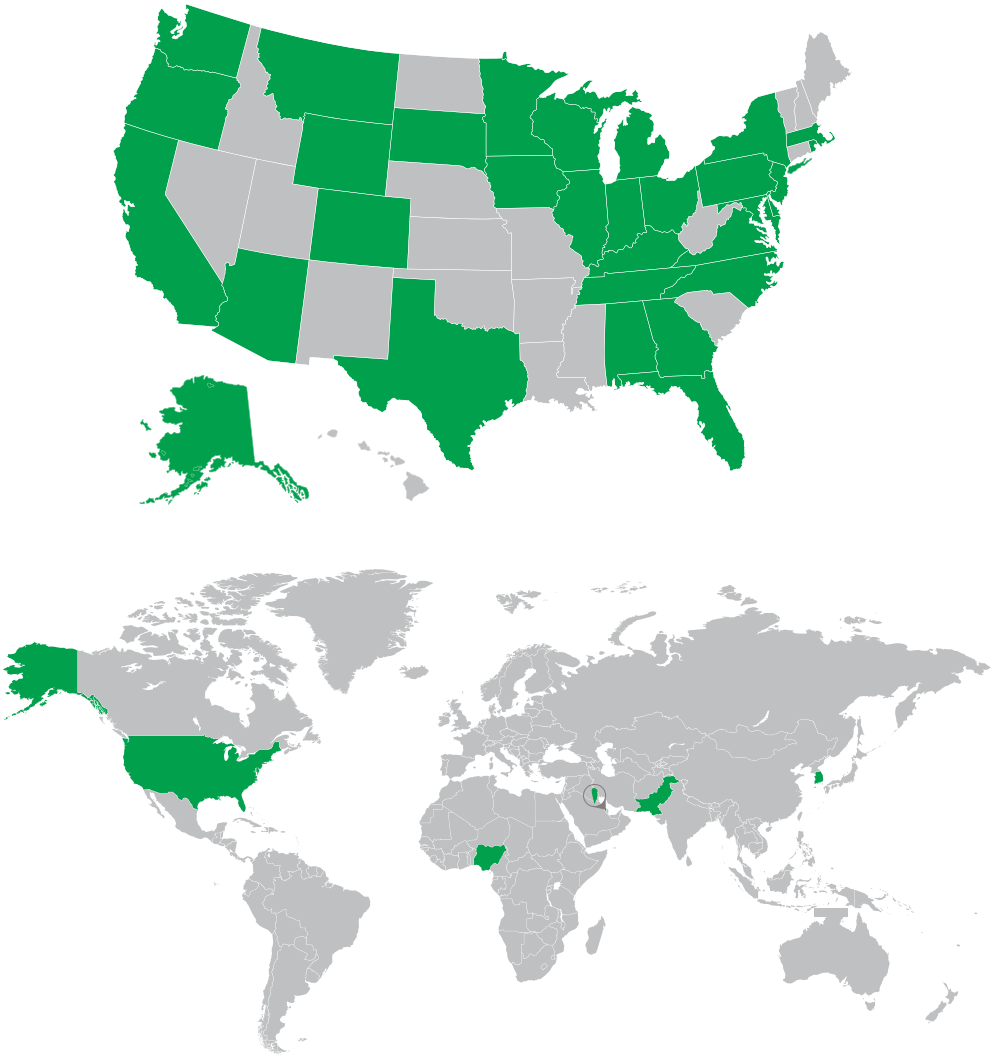
SYP ALUMNI: SEVENTH-YEAR SCOPE*



*Seven-year overview of matriculated students at Michigan Tech

SYP 2016 ATTENDEES

31 states and five countries represented



Summer Youth Programs

1,136

TOTAL PARTICIPANTS

syp.mtu.edu

FACEBOOK
facebook.com/MichiganTechSYP

TWITTER
twitter.com/mtusyp

FLICKR
flickr.com/photos/michigantechyp

YOUTUBE
youtube.com/c/MichiganTechCPCO

Summer Youth Programs encourages participants to be bold. Choose adventure. Push limits.

Our mission is quality, innovative teaching and learning experiences that promote collegiate studies, college life, and career awareness to a diverse group of pre-college students. Through hands-on, discovery-based programs, students break out of their comfort zone and stretch their imaginations without the pressure of grades, exams, or assignments.

Michigan Tech prepares its students to create the future, and SYP provides a bridge to pre-college students–insight into what that future may look like. Summer Youth Programs strives to prepare students in science, technology, engineering, and math so college can be a viable option for their future. Facilities at Michigan Tech, along with our research and teaching faculty, college deans, and advisors, help students develop college and degree goals. Interactions with current college students provide role models, encouragement, and guidance.

After completing their explorations, 99 percent of participants were inspired to learn more about the subjects they studied.

93%
felt their exploration differed from their classrooms back home

64%
felt more likely to attend college

60%
showed interest in coming back for another summer

86%
gained confidence in their ability to be successful in a college atmosphere

93%
would recommend their exploration to others

18%
could not have attended without a scholarship

49 total courses offered in 2016, including:

Aviation and Aerospace

Computer and Electrical Engineering

Chemical Engineering

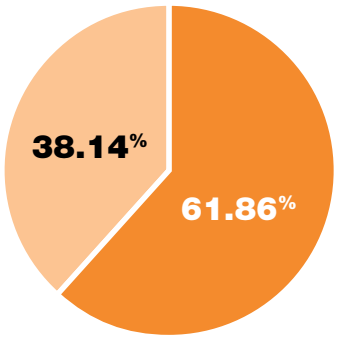
Blacksmithing

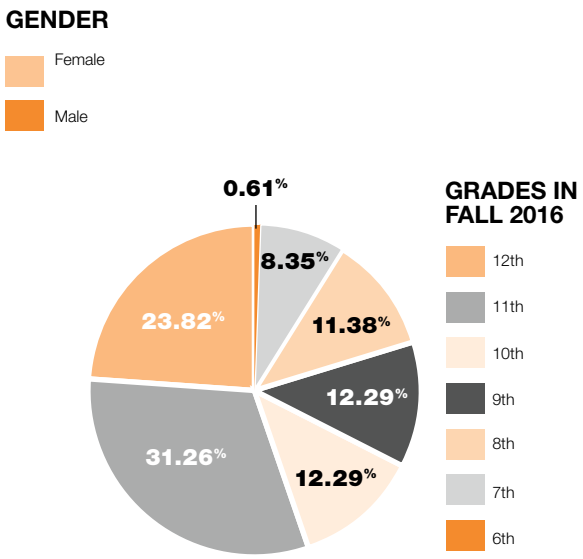
Video Game Programming

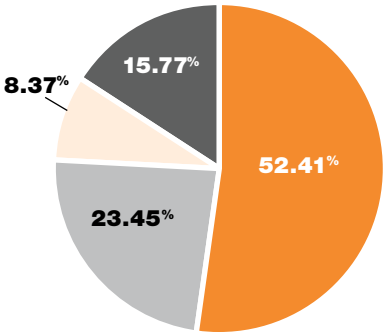
Outdoor Leadership

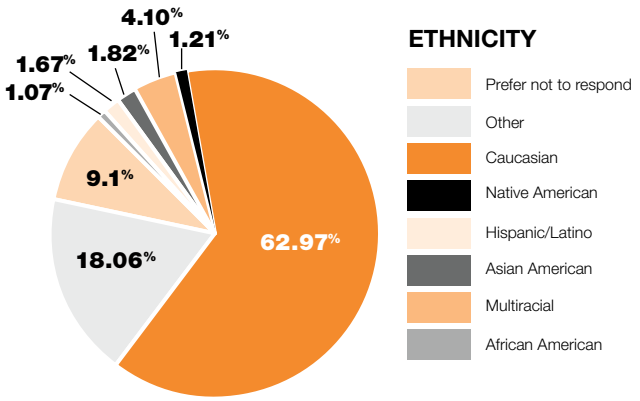
Forensic Science and CSI

DEMOGRAPHICS









"Summer Youth Programs was an amazing experience. It helped me determine the career to pursue. I recommend this camp to every middle and high schooler!"

Women in Engineering

140
TOTAL PARTICIPANTS

FACEBOOK
facebook.com/MichiganTechWIE

Through Women in Engineering (WIE), 140 young women explored different areas of engineering and their applications. They learned about engineering careers, investigated the many ways engineers impact the quality of our lives, and developed team skills through ImagiNation simulations. The participants also met female role models who work in engineering fields and discussed how to be successful in undergraduate engineering programs.

The young women got a taste of campus life as well. They met other students and built networks and friendships while enjoying the recreation and natural setting of Michigan's Upper Peninsula.

Sponsored by 3M and Ford Motor Company

"I got the extra push of encouragement to be the best version of myself—and to be successful."

3.99
Women in Engineering average GPA

97%
would recommend Women in Engineering to others

88%
felt more likely to pursue a career in engineering

86%
considered themselves very informed regarding the variety of career options available in engineering

88%
rated the hands-on activities as above average

Engineering Group Projects

Design and construct a balsa wood structure and test it against an "earthquake"

Plan a space mission to Mars

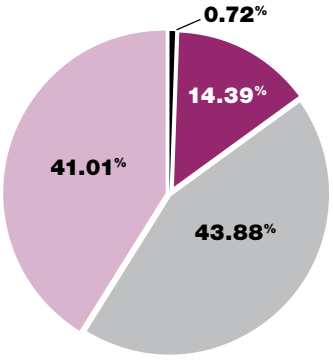
Design web pages and games

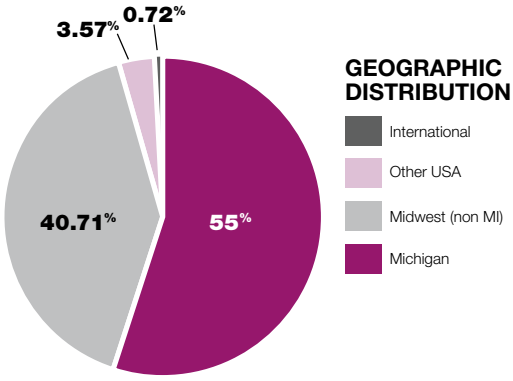
Build a working hologram

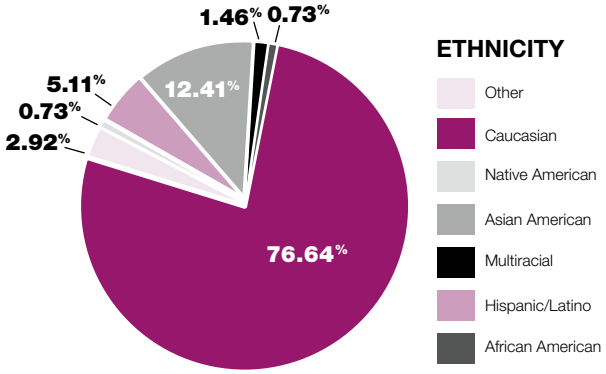
Blacksmith to create a project by deformation and thermal processing

Reprogram a robot

DEMOGRAPHICS







Bridges. Natural disasters. And chemical reactors.

Students participated in projects during nine different engineering sessions, including:

Deconstructing a hair dryer to learn how its mechanical and electrical components interact

Designing a bridge and testing its strength

Operating a continuous chemical reactor

Recreating natural disasters and studying how natural components affect severity

Thermo-mechanical processing of shape memory wire

Hiking in local wetlands to discover the importance of environmental engineering

Engineering Scholars Program

142

TOTAL PARTICIPANTS

FACEBOOK
facebook.com/MichiganTechESP

During the Engineering Scholars Program (ESP), 142 participants explored careers in mechanical, computer, environmental, electrical, chemical, biomedical, civil, geological, and materials engineering.

The students got inside information from role models working in engineering fields and learned to work in teams to tackle group projects. They developed team skills through ImagiNation challenges, learned about the college application process, and received tips for succeeding in university engineering programs. Participants also investigated the many ways an engineer can impact quality of life.

Experiencing college is important as well—staying in a residence hall, exploring campus, and meeting people with similar interests. Students enjoyed team competitions, a variety show, and outdoor activities in Michigan's Upper Peninsula.

> "I didn't know what I was capable of achieving until I attended Summer Youth Programs."

3.9
Engineering Scholars Program average GPA

96%
would recommend the Engineering Scholars Program to others

90%
felt more likely to pursue a future career in engineering

91%
felt more informed of the wide variety of career options in engineering

91%
rated the hands-on activities as above average

Engineering Group Projects

Saponification: making soap

Mud and fire: geological engineering as it related to natural hazards

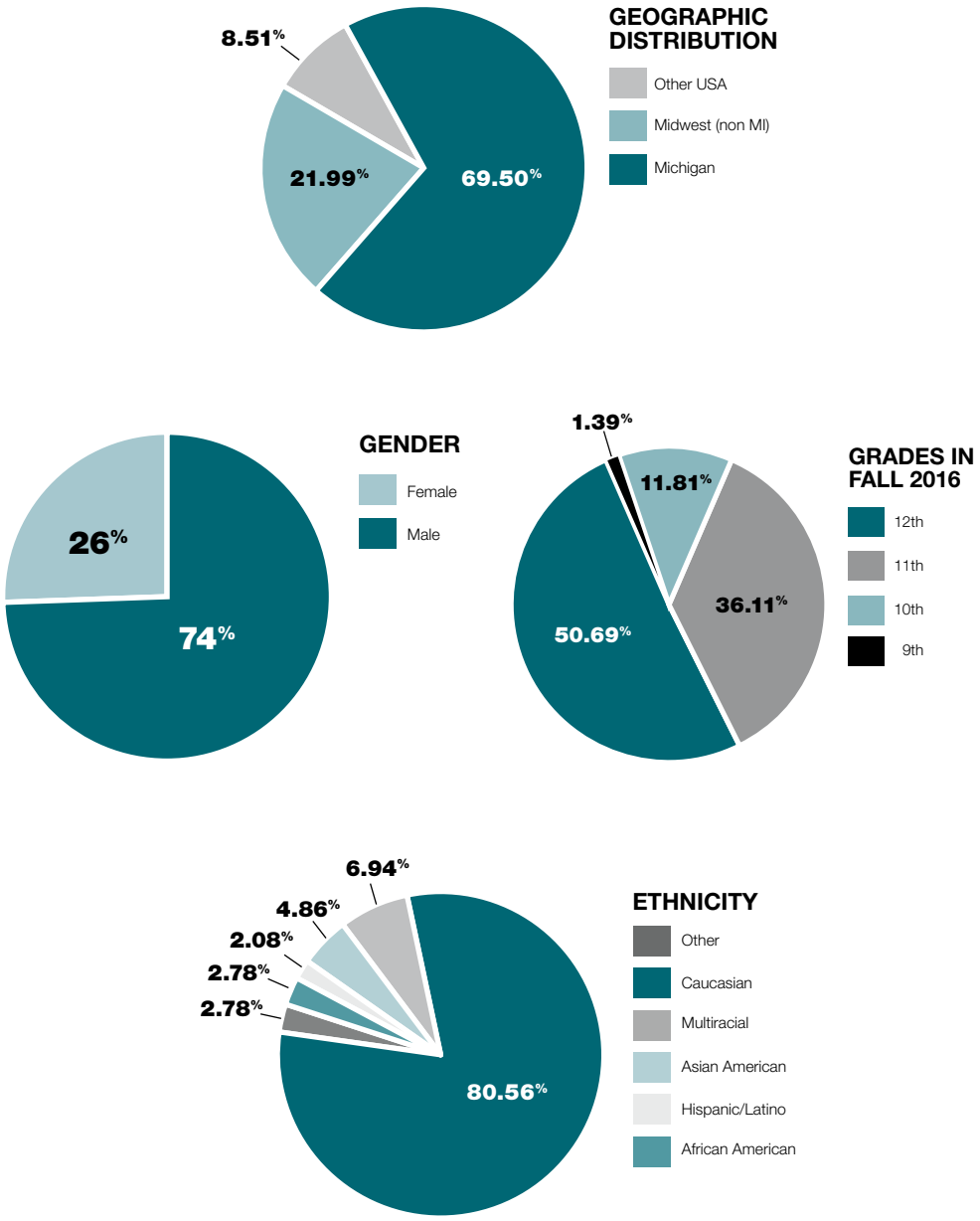
Blacksmithing

Holography and fluorescent materials

Build strong structures

Plan a space mission to Mars

DEMOGRAPHICS



Hiking. Hair dryers. And thermo-mechanical processing.

Students participated in projects during a series of nine engineering sessions, including:

Disassembling and reassembling a hair dryer to understand its mechanical components

Designing a bridge and testing its strength

Recreating natural disasters and studying the part that natural components play in their severity

Hiking in local wetlands to discover the importance of environmental engineering

Thermo-mechanical processing of shape memory wire

Operating a continuous chemical reactor

34

TOTAL PARTICIPANTS

Women in Computer Science

In partnership with Ford Motor Company and Jackson National Life Insurance Company, the Women in Computer Science (WICS) program provided 34 high school females an opportunity to explore careers and areas in the computing industry. Students developed team- and problem-solving skills while they created an application for a different demographic (think working parents or senior citizens) using the MIT App Inventor. Participants met guest speakers and industry role models who broadened their perspective of women in this field.

At Jackson, participants toured the facility, learned about available computing opportunities, and discussed projects involved in this career. The group became acquainted with college life while connecting with other young women with similar interests.

Sponsored by Ford Motor Company and Jackson National Life Insurance Company

Computing Explorations

Programming
Artificial Intelligence
Data Mining
Virtual Reality
Visualization
Networks
Cybersecurity

Participating Role Models From Industry

Google
Netflix
Atomica Object
CQL
Microsoft

Average Weighted GPA of Women in Computer Science Program

4.0

Weighted GPAs give additional points for advanced courses such as Advanced Placement courses

"I've always been interested in computer science, but this week made me sure this is a field worth pursuing."

DEMOGRAPHICS

Grades in Fall 2016
19% 10th
42% 11th
39% 12th

Geographic Distribution
6 Other USA
5 Midwest (non Michigan)
23 Michigan

Ethnicity
50% Caucasian
41% Asian American
3% Multiracial
3% Hispanic/Latino
3% African American

24

TOTAL PARTICIPANTS

Women in Automotive Engineering

This year, the Women in Automotive Engineering (WIAE) was introduced in partnership with Fiat Chrysler Automobiles. This scholarship program offered a discovery of disciplines, knowledge, and careers in automotive engineering for 24 young women. Students explored areas of automotive engineering and its application, learned about careers, and developed new skills in automotive labs.

The participants also met female role models working in the automotive engineering industry, and other students with similar backgrounds and interests. They got a taste of campus life while enjoying the recreation and natural setting of Michigan's Upper Peninsula.

Sponsored by FIAT Chrysler Automobiles

100%
of participants indicated having an interest in engineering after attending WIAE

87%
of participants would recommend Women in Automotive Engineering to others

87%
of participants considered themselves "very informed" regarding the variety of career options available in engineering

83%
of participants felt more likely to have a career in engineering after attending Women in Automotive Engineering

Average Weighted GPA of Women in Automotive Engineering

3.9

Weighted GPAs give additional points for advanced courses such as Advanced Placement courses

"WIAE encourages women to learn more about automotive engineering."

DEMOGRAPHICS

Grades in Fall 2016
13% 9th
22% 10th
43% 11th
22% 12th

Geographic Distribution
5 Other USA
4 Midwest (non Michigan)
15 Michigan

Ethnicity
57% Caucasian
13% Asian American
13% Multiracial
4% Hispanic/Latino
9% African American
4% Native American

27

TOTAL PARTICIPANTS

National Summer Transportation Institute

During the National Summer Transportation Institute (NSTI), 27 participants explored different areas of transportation, including planes, trains, automobiles, and ships. Students learned about bridge design, airport construction, and snow roads in Antarctica from role models working in transportation fields.

Field trips allowed students to explore real-world transportation projects. They visited the all-wood Eagle River Bridge, the Portage Lake Lift Bridge, and Isle Royale. The group also went on a weekend excursion to Sault Ste. Marie and St. Ignace to tour the Soo Locks, International Bridge, and Mackinac Bridge.

In addition to travel, NSTI students became acquainted with college life and extracurricular activities on campus while meeting other talented teens with similar backgrounds and interests.

Sponsored by MDOT and Federal Highway Administration

100%
of participants rated the hands-on activities as above average—many said this was their favorite part of NSTI

93%
of participants felt more informed about their career options in the transportation field

92%
of participants felt the transportation industry has greatly contributed to solving world problems

74%
of participants felt more motivated to learn about the transportation industry after NSTI

After completing NSTI, participants plan to take the following transportation or related classes during high school or college:

100%—Math
96%—Science
81%—Technology
67%—Transportation
89%—Design
44%—Shop

"Five years from now I will remember traveling to new places and experiencing things I never thought I would."

DEMOGRAPHICS

Grades in Fall 2016
48% 10th
44% 11th
7% 12th

Gender
52% Female
48% Male

Geographic Distribution
2 Other USA
5 Midwest (non Michigan)
20 Michigan

Ethnicity
74% Caucasian
7% Asian American
4% Multiracial
4% Other
11% African American

24
TOTAL PARTICIPANTS

Junior Women in Engineering

Following the success of Women in Engineering for high school students, 2016 saw the introduction of the middle school version of the program in partnership with Ford Motor Company. During Junior Women in Engineering (JWIE), 24 students explored different areas of engineering. Through hands-on activities like testing water quality, working with an i-Robot, building balsa wood gliders, and designing model prosthetic legs, they explored how engineers impact the world around them. Modeled on our high school competitive scholarship programs, JWIE offered an introduction to many engineering disciplines.

JWIE students also got a taste of college life by living in a residence hall throughout the week. Evening activities enhanced the experience which, for some, was the first time living away from home.

Sponsored by Ford Motor Company

100%
of participants would recommend Junior Women in Engineering to others

100%
of participants consider themselves "very informed" or "extremely informed" regarding the variety of career options available in engineering

100%
of participants indicated having an interest in engineering after attending Junior Women in Engineering

96%
of participants felt more likely to have a career in engineering after attending Junior Women in Engineering

"It was one of the best experiences I've had in my life."

"This is not only educational, but fun! You learn how to problem-solve independently and with others. The list goes on and on . . ."

DEMOGRAPHICS

Grades in Fall 2016
12.5% 6th
37.5% 7th
50% 8th

Geographic Distribution
7 (non Michigan)
17 Michigan

Ethnicity
83% Caucasian
13% Asian American
4% African American

Mind Trekkers

mindtrekkers.mtu.edu

FACEBOOK
facebook.com/MindTrekkers

TWITTER
twitter.com/mindtrekkers

FLICKR
flickr.com/photos/michigantechyp

YOUTUBE
youtube.com/c/MichiganTechCPCO

Mind Trekkers is Michigan Tech's K-12 outreach initiative. With its traveling roadshow, the group brings the excitement of science, technology, engineering, and mathematics directly to young students. Mind Trekkers attends expos and events throughout the nation to showcase engaging, hands-on experiments and activities.

Undergraduate and graduate student volunteers serve as a pipeline, connecting thousands of prospective students to the Michigan Tech family while enjoying one-of-a-kind opportunities and experiences. Mind Trekkers inspires our next generation of leaders to seek answers, get excited, and question the traditional boundaries of STEM education.

"Thanks to Mind Trekkers, I am inspired to be whatever I want. Right now I am leaning toward becoming a scientist."

2016 OVERVIEW

16
events

7
states including Michigan, Wisconsin, Minnesota, Texas, Massachusetts, Delaware, Tennessee, plus Washington, DC

18,000
miles

415,000
people reached

151
traveling Mind Trekker volunteers

30
different majors

2016 Events

Einstein Expo–Green Bay, WI

NWTC Science & Engineering Festival–Green Bay, WI

Adventures in STEM Science & Engineering Festival–Houston, TX

NSBE National Conference–Boston, MA

Independence School Family Night–Newark, DE

USA Science & Engineering Festival–Washington, DC

Exploration Sensation–Sault Ste. Marie, MI

Destination Imagination–Knoxville, TN

Dow Great Lakes Bay STEM Festival–Midland, MI

NTC Wausau Science & Engineering Festival–Wausau, WI

Southeast Michigan Science & Engineering Festival–Livonia, MI

"I liked how everyone was excited to share what they were presenting. It inspired me to have fun with school, knowing you can learn so much and do these amazing things."

"It's a whole different world! There's demonstrations for kids that you just can't do in the classroom."

Experience. Learn. Share. Here's what teachers say about Mind Trekkers:

100% are likely to repeat a demonstration and share demos with others

100% agree this event offered activities/resources not normally provided in their classrooms

100% felt the event format supported learning and engagement

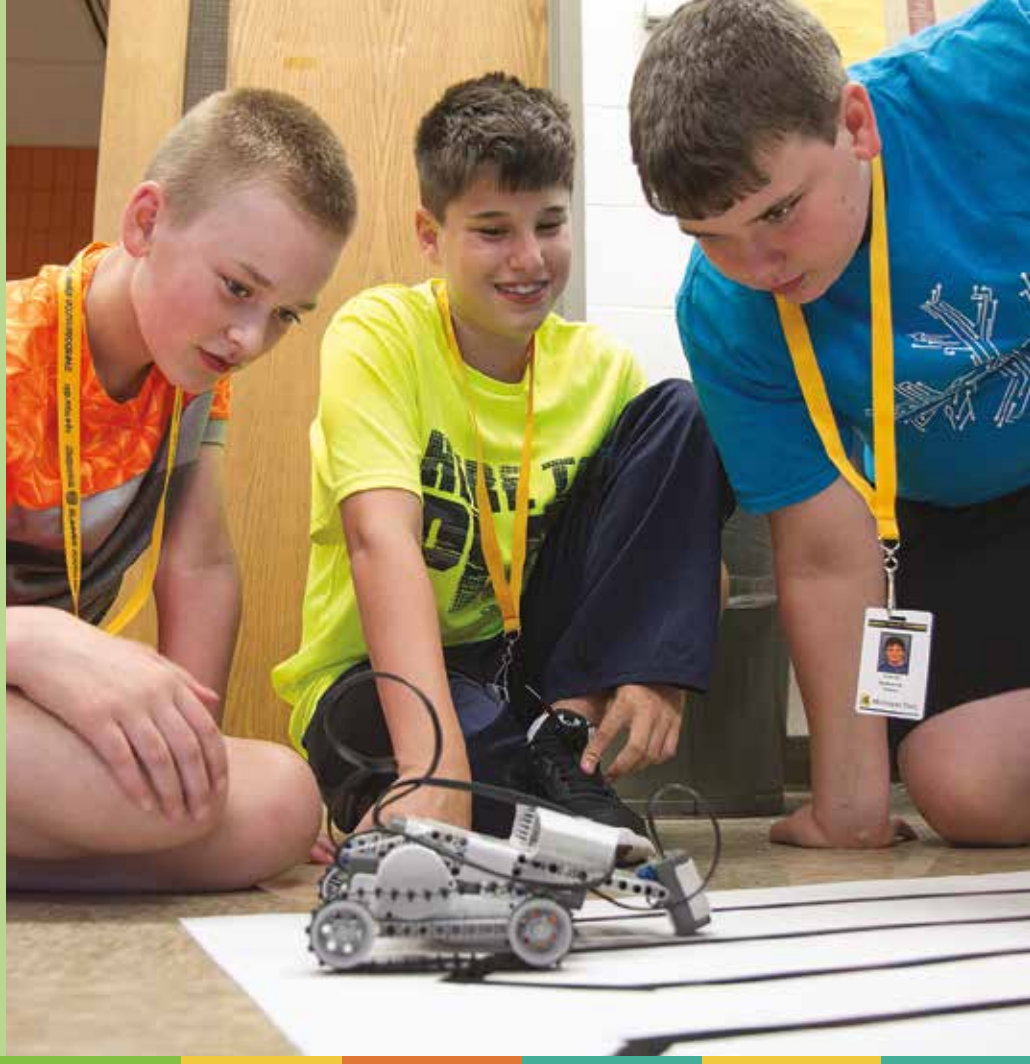
90% intend to do a Mind Trekkers demonstration in their classroom and share a demo with another teacher

73% of students think differently about what scientists and engineers do

77% of students are more interested in attending college

The Center for Pre-College Outreach has specific College Access programs designed to expose students from our community to the university world. The goal is to promote college attendance among students in the Keweenaw and across the Upper Peninsula, and lend support to other efforts.

College Access initiatives include visiting a small group of students at their school, discussing financial aid, and bringing 240 middle school students to campus for a day. Some events happen once each year, others are recurring; the program is unique for each audience.



College Access

gearUP MICHIGAN TECH

FACEBOOK
facebook.com/michigantechgearup

GEAR UP

Michigan Tech partners with MI GEAR UP and the King-Chavez-Parks Initiative to provide pre-college programming through tutoring, mentoring, on-campus events, and professional development for teachers. Our program assists nearly 380 students in graduating class 2017, and works regularly with eight local schools.

GEAR UP services range from homework help to college campus tours. In 2016, the entire cohort came to campus for a conference-style event—sessions included information about financial aid, safety and wellness, and potential careers.

Summer Youth Programs scholarships are also offered to GEAR UP students.

87% of GU students feel they now know more about how to pursue future educational goals.

Women in Science and Engineering

On February 23, 240 seventh- and eighth-grade girls from the Western Upper Peninsula spent the day at Michigan Tech exploring the world of engineering. Participants competed in STEM-themed activities, like testing the conductivity of materials, filtering polluted water, and designing model heart valves. This event is made possible by continuing partnerships with the Western Upper Peninsula Center for Science, Mathematics, and Environmental Education; the College of Engineering; and the College of Sciences and Arts.

Get WISE
WOMEN IN SCIENCE & ENGINEERING

86%
say the event made them think about math and science differently

92%
feel more confident in their ability to come up with creative solutions

Blizzard Bowl

On February 27 and October 8, Michigan Tech Quiz Bowl partnered with the Center for Pre-College Outreach to offer a quiz bowl tournament for UP high school students. The first-ever Blizzard Bowl welcomed more than 40 students from six different schools for a round-robin style tournament. Playing in teams of four, the students faced off over questions about history, literature, science, and popular culture. Blizzard Bowl was made possible by a grant from the Michigan Space Grant Consortium.

Engineering Olympics

The 26th annual Engineering Olympics was held on March 23. The event challenged 97 high school students from seven UP schools to work on projects (like trebuchets and mousetrap-powered cars) throughout the school year. Students also had the option of meeting with a panel of college students to learn about college life. The event was put on with continuing support from the Department of Engineering Fundamentals and the College of Engineering.

ENGINEERING
OLYMPICS

Lighthouse Learners

Lighthouse Learners is hosted at Calumet, Laurium, and Keweenaw (CLK) Public Schools. Founded by Barbara and Paul Horton '69, the program aims to make college a reality for participants. Currently, a small cohort of high school students from the class of 2018 are involved with the program. Lighthouse Learners focus on personal and academic development including service learning/community service, study skills and success, spiritual life, and building a connection to Michigan Tech. In 2015-16, the students all took on personal development challenges as they navigated extracurriculars and class loads.

Thank you to our 2015-16 Industry Sponsors

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Center for Pre-College Outreach

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