



# **CENTER FOR PRE-COLLEGE OUTREACH**

2014 Annual Report

[www.mtu.edu/precollege](http://www.mtu.edu/precollege)





**ANNUAL REPORT 2014**

Overall Impact	4
Summer Youth Programs	6
Women in Engineering	8
Engineering Scholars Program	10
Women in Computer Science	12
National Summer Transportation Institute	14
Mind Trekkers	16
College Access	18

Michigan Technological University is an equal opportunity educational institution/equal opportunity employer, which includes providing equal opportunity for protected veterans and individuals with disabilities. 34205 0315

**What do you want to be when you grow up?**

That’s a common question we often ask young people today. Maybe it’s because we heard it ourselves growing up, and the words are so ingrained in our brains. Or perhaps it just seems like an easy gateway for gauging what makes them tick. Another reason might be this: hearing people dream out loud is simply infectious. Yet, what if we did not have to resort to patiently envisioning “what might be?” What if we could provide a way to switch “when you grow up” to “right now”? Really. Why can’t we ask, “What do you want to be right now?”

Well, at Michigan Tech, we do.

There’s a lot happening at Michigan Tech, and an incredible strength of ours is having the capacity to greatly impact future generations through innovative, hands-on outreach. An important part of this work is the engaging programs at by the University’s Center for Pre-College Outreach.

At the heart of each experience is student awareness—that they are not merely going through the motions of an ordinary field trip. On the contrary, they are embracing the moment, being creative, and getting their hands on unabashed, fun learning.

At Michigan Tech, we strive to inspire scholarship. Our community doesn’t idly wait for our future workforce to stumble upon educational opportunities; we reach out and provide experiences that play with possibilities, shape dreams, and help make them a reality. We have created a culture that fosters the talent and skills of our prospective leaders and change-makers. And we are proud of what we do!

Thank you for your support,

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







# Our Impact

14  
TRAVELING EVENTS FOR  
MIND TREKKERS

56  
TOTAL SUMMER YOUTH  
PROGRAM COURSES

140,965\*  
TOTAL OUTREACH  
PARTICIPANTS IN 2014\*

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

Across government, industry, the non-profit community, and educational institutions, a consensus has been reached: the US must develop a sustainable system that develops human capital equipped with knowledge and expertise in science, technology, engineering and mathematics (STEM). The best way to increase STEM interest and competence is by reaching youth in their formative years, sparking their sense of wonder at what these fields offer.

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 provides a platform for more than 1,000 students from across the world to become fully immersed in a field and explore future career paths. Mind Trekkers, our wide-reaching mobile roadshow, showcases STEM in action for hundreds of thousands of people. These programs not only introduce youth to the fundamentals of STEM—they actually enable the students themselves to be scientists, mathematicians, and engineers.

Many of these students then come to Michigan Tech where they continue their STEM education.

## TOTAL SYP ALUMNI ON CAMPUS:

558  
students

7.9%  
of student body

39%  
increase over 5 years

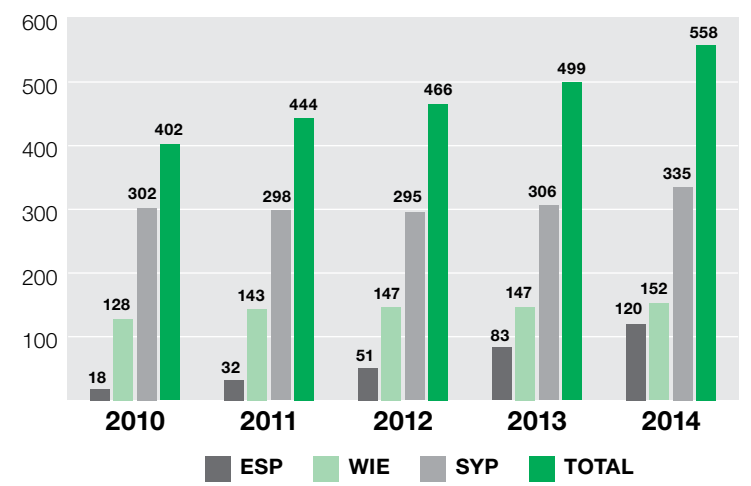
91%  
majoring in STEM fields

241  
are female students

81%  
call Michigan home

24%  
enrolled in mechanical  
engineering-engineering  
mechanics

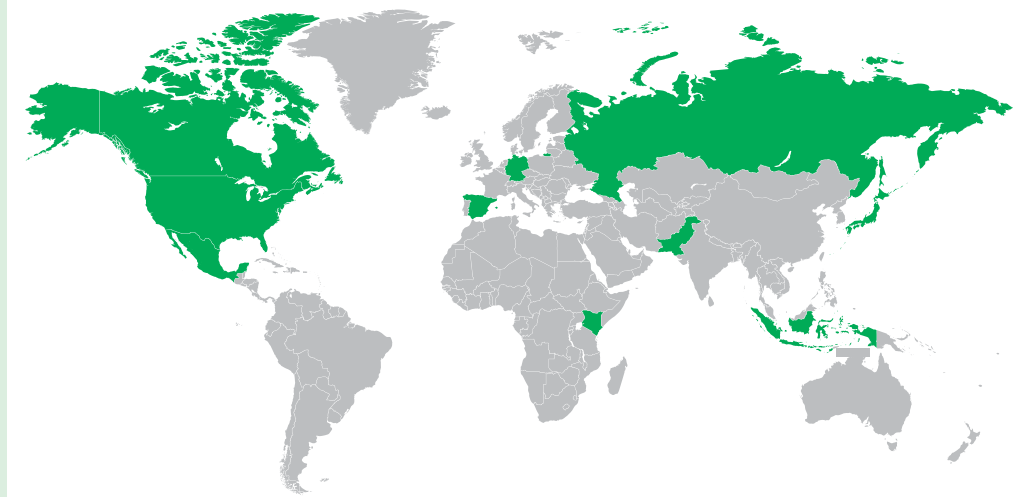
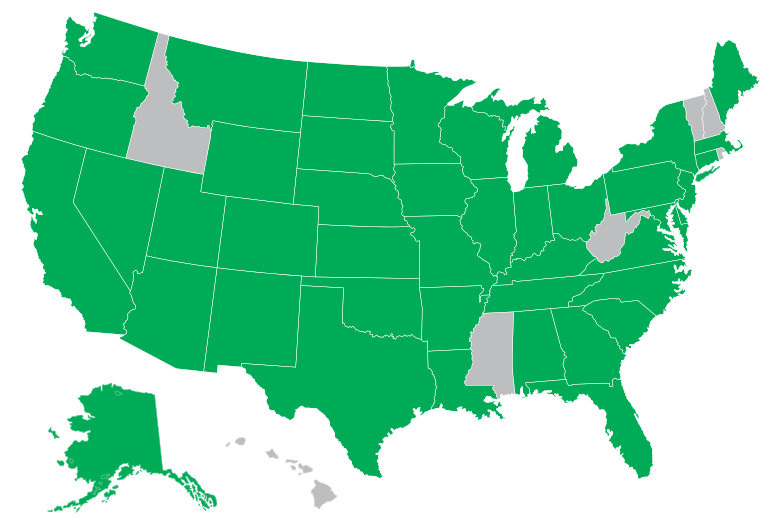
## SYP ALUMNI: FIVE YEAR SCOPE\*



\*Five year overview of matriculated students at Michigan Tech

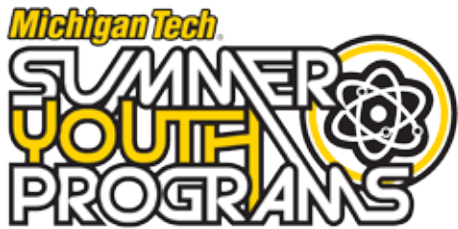
## SYP 2014 ATTENDEES

44 states—an increase of 21 states over 2013. Additionally, 13 nations are represented.





# Summer Youth Programs



**FACEBOOK**  
facebook.com/MichiganTechSYP

**TWITTER**  
Michigan Tech SYP—@mtusyp  
twitter.com/mtusyp

**FLICKR**  
flickr.com/photos/michigantechyp

**YOUTUBE**  
youtube.com/c/MichiganTechCPCO

As a strong advocate for experiential learning, Summer Youth Programs encourages participants to be bold, choose adventure, and push the limit. Our mission is to offer quality, innovative teaching and learning experiences that promote investigation of collegiate studies, college life, and career awareness to a diverse group of pre-college students. Through hands-on and discovery-based programs, our students get the opportunity to step out of their comfort zone and stretch their imagination without the inherent pressure of grades, exams, or assignments. Michigan Tech prepares its students to create the future, and we provide a bridge to pre-college students to grant

them insight into what that future may look like. Summer Youth Programs strives to prepare students in the pivotal fields of science, technology, engineering, and math (STEM-related subjects) so that college can be a viable option for their future. The specialized facilities at Michigan Tech, along with our research and teaching faculty, college deans, and advisors help students develop clear college and degree goals. Interactions with successful current college students provide relatable role models, encouragement, and guidance. After completing their explorations, 97.18% of participants were inspired to learn more about the subjects they studied.

93.84%  
felt their exploration differed from their classrooms back home.

69.67%  
felt more likely to attend college.

88.66%  
showed interest in coming back for another summer.

86.3%  
gained confidence in their ability to be successful in a college atmosphere.

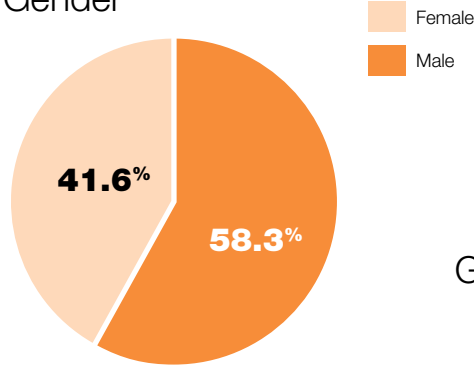
96.86%  
would recommend their exploration to others.

11.68%  
could not have attended without a scholarship.

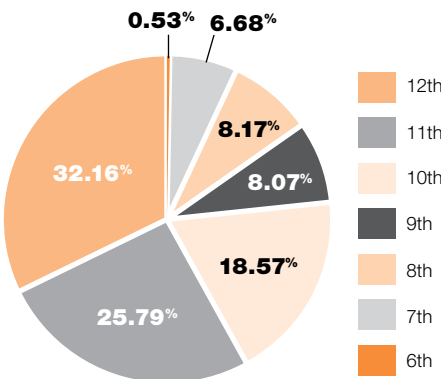
56 total courses offered in 2014, including:  
Chemical Engineering  
Mechanical Engineering  
Blacksmithing  
CSI and Forensic Science  
Stop the Hackers!  
Rocketry and Space Science  
Mobile Robotics

## DEMOGRAPHICS

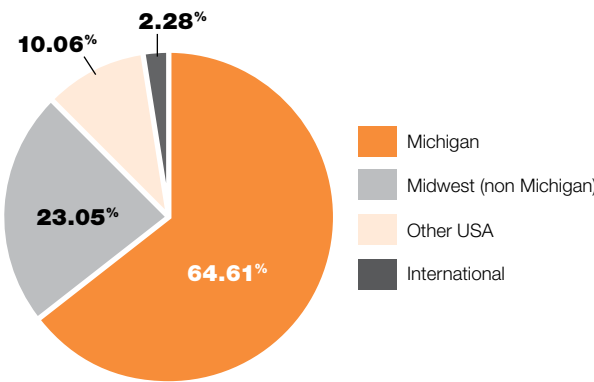
Gender



Grades in Fall 2013



Geographic Distribution



## PARTICIPANT COMMENTS

“It focused more on understanding the content than finishing a worksheet for a grade. There was also much more one on one time with instructors.”

“It was such a great experience, and there is such a diverse range of participants; everyone can find their place here.”

“This exploration was great for learning about Michigan Tech and the opportunities they have for students as well as good for learning about mechanical engineering categories.”





# Women in Engineering



**f FACEBOOK**  
facebook.com/MichiganTechWIE

**142**  
**TOTAL PARTICIPANTS**

Through the Women in Engineering program, 142 young women explored different areas of engineering and their applications. They learned about the variety of engineering careers, investigated the many ways an engineer can directly impact the quality of people's lives, and developed team skills through Destination 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, building networks and friendships and enjoying the recreation and natural setting of Michigan's Upper Peninsula.

**3.9**

**Women In Engineering Average GPA**

**94.41%**

**of participants would recommend Women in Engineering to others.**

**90.85%**

**felt more likely to pursue a career in engineering.**

**83.10%**

**considered themselves very informed regarding the variety of career options available in engineering.**

**88.81%**

**rated the hands-on activities as above average.**

## Engineering Group Projects

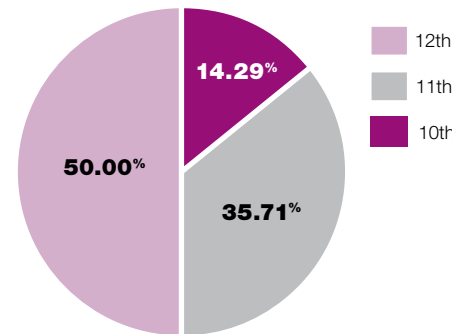
Designing and constructing a balsa wood structure and testing it against an "earthquake"

Constructing a virtual world and experiencing it in a virtual-reality lab

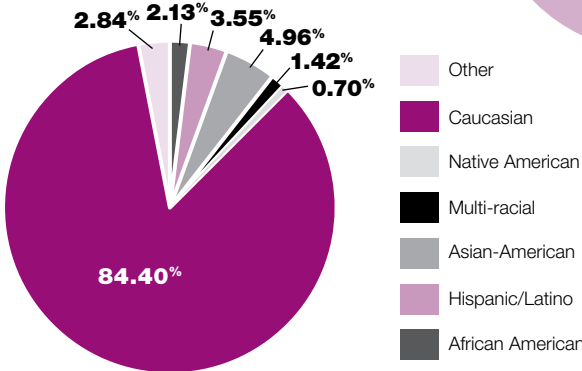
Learning about blacksmithing and creating a project by deformation and thermal processing

## DEMOGRAPHICS

Grades in Fall 2013



Ethnicity



## Engineering Sessions

Students participated in projects during their nine different engineering sessions, which included:

Building a motorized robot with toothbrush components

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

Using an atomic force microscope to explore the strength of nanoparticles

## PARTICIPANT AND PARENT COMMENTS

"I want to be a leader, blazing a trail for the future of science and technology. After Women in Engineering, I am sure I can be."

"The program opened my eyes to opportunities I didn't think were possible, and I am a better student because of it."

"My daughter got to further explore an area of interest, engineering, and it helped to solidify her desire to follow that as a career path. Also, she had a great experience, so much so that she is considering applying to Michigan Tech!"





# Engineering Scholars Program



**f FACEBOOK**  
facebook.com/MichiganTechESP

**152**  
TOTAL  
PARTICIPANTS

During the Engineering Scholars Program, 152 participants explored careers in areas like mechanical, computer, environmental, electrical, chemical, biomedical, civil, geological, and materials engineering.

The students also 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 Destination Imagination challenges, learned about the college application process, and received tips for succeeding in university engineering programs. The young men

and women investigated the many ways an engineer can directly impact the quality of people's lives.

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

**3.88**

Engineering Scholars Program GPA

**96.93%**

of participants would recommend Engineering Scholars Program to others.

**92.86%**

felt more likely to pursue a future career in engineering.

**87.35%**

consider themselves 'Very Informed' about the options available in engineering.

**90.55%**

said their group projects helped them understand engineering applications.

.....

## Engineering Group Projects

Saponification: making soap

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

Blacksmithing

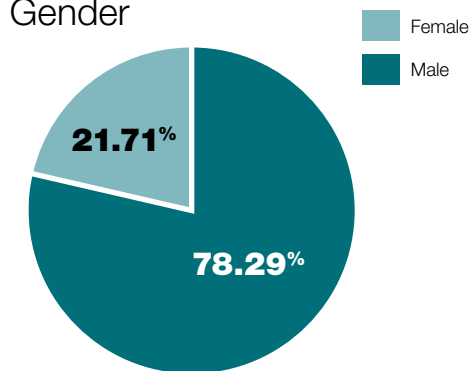
Prosthetic leg: using biomedical engineering while on a budget

Remotely operating an underwater vehicle and testing it in a dive tank

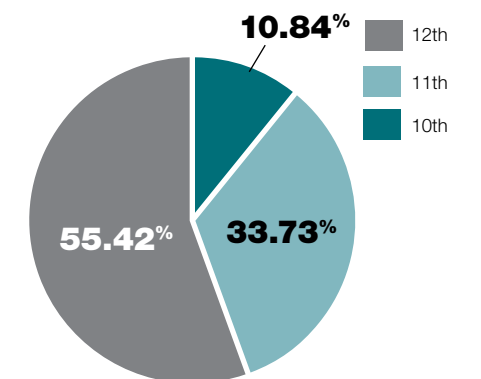
Distracted driving: learning about human factors engineering

## DEMOGRAPHICS

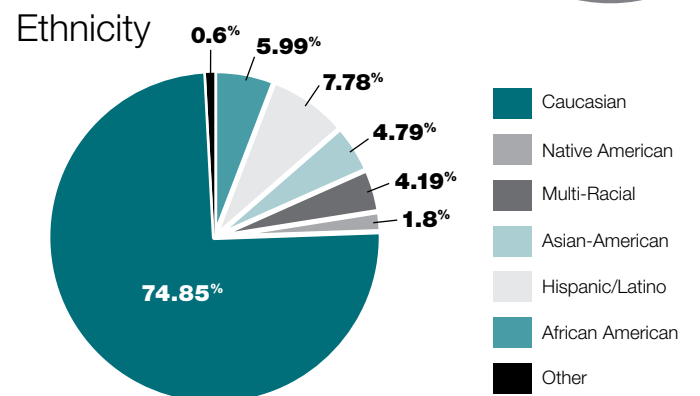
### Gender



### Grades in Fall 2013



### Ethnicity



## Engineering Sessions

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

Building a 'bristlebot' with toothbrush components

Designing a bridge and testing its strength

Operating a continuous chemical reactor

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

Exploring the world of the tiny in nanotechnology

Thermo-mechanical processing of shape memory wire

## PARTICIPANT COMMENTS

"Even though we only had a week to explore all the different aspects of engineering, it was enough time to really ignite my passion and encourage me to aspire to become a biochemical engineer after college."

"These people had no preconceived notions about me, and I was able to really be myself. I liked working in groups where I wasn't afraid to express myself."

"The program helped my son decide on his major as he was unsure which computing science field to look into. He now feels confident in his choice of software engineering."





# Women in Computer Science



**36**  
TOTAL  
PARTICIPANTS

For the second Jackson Women in Computer Science program, participant numbers doubled compared to 2013. The young women developed team and problem-solving skills by completing a hands-on team project, which challenged the young women to use MIT App Inventor to create a useful application aimed for a different demographic than themselves. The guest speaker sessions, industry role model sessions, project work, and tours provided a number of learning opportunities. Approximately two-thirds of the students had at least some programming experience ranging from self-taught using Code Academy to multiple programming courses.

Similar to the program's first year, the guest speaker opportunities were highly successful. Role models from industry spoke to students about data mining, virtual reality, data visualization, artificial intelligence, and security. These women work in a broad range of computer science positions including an advisor to a senior VP, tester, developer, project manager, director, and scientist. Each presenter demonstrated approachable material related to her research areas.

The 36 students also became acquainted with college life and extracurricular activities on campus. They met other young women with similar interests, lived on campus, and played outdoors.

## AVERAGE WEIGHTED GPA OF WOMEN IN COMPUTER SCIENCE PROGRAM

4.1

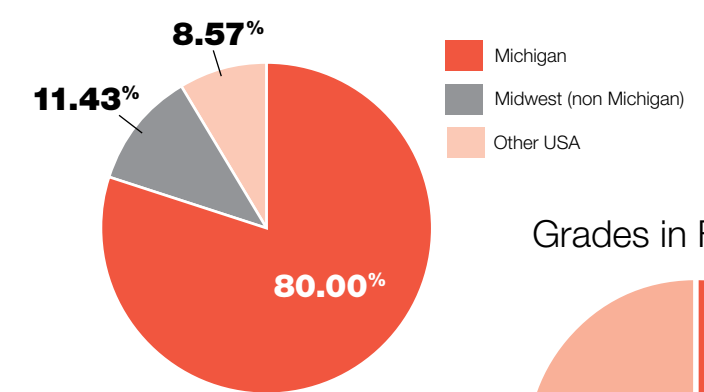
Weighted GPAs give additional points for advanced courses such as Advanced Placement courses.

## Computing Courses

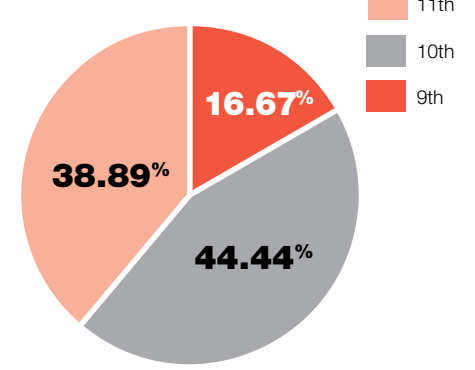
- Programming
- Artificial Intelligence
- Data Mining
- Virtual Reality
- Visualization
- Networks
- Cybersecurity

## DEMOGRAPHICS

### Geographic Distribution



### Grades in Fall 2013



## PARTICIPANT COMMENTS

"Talking to women in computer science really opened my eyes about how computer science is all about problem solving and working with others. After attending the program, I am definitely more interested in the field of computer science."

"My school does not offer computing classes and I have generally never been encouraged to pursue an education or career in science because I'm a girl. The program proved to me that computer science is important and women in the field are very successful."

"Amazing. Fantastic. Life-changing."

## IMPORTANCE OF ROLE MODELS

Only a third of the young women participating had a female role model in a computing field prior to coming to Women in Computing Science. For about half, that role model was a computing teacher. Students were asked on the pre- and post-surveys to list five adjectives that come to mind when thinking of a woman in computer science. On both the pre- and post-survey, students listed attributes such as smart, nerdy, and brave. Adjectives that were listed on the post-survey that did not appear in the pre-surveys included: fun, problem-solver, thinker, wonderful, and beautiful. Meeting role models in the field broadened student perspective of women in the field.

## PARTICIPATING ROLE MODELS FROM INDUSTRY:

- Google
- Microsoft
- Netflix
- Amazon
- Adventium Labs
- Atomic Object





# National Summer Transportation Institute



27  
TOTAL PARTICIPANTS

During the National Summer Transportation Institute, 27 participants used hands-on activities to explore different areas of transportation, including planes, trains, automobiles, and ships. Students learned from role models working in transportation fields about topics like bridge design, airport construction, and snow roads in Antarctica.

Field trips allowed students to explore real-world transportation projects. They visited local attractions, such

as the Eagle River Bridge, Portage Lake Lift Bridge, and Isle Royale. The young women and men 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, they became acquainted with college life and extracurricular activities on campus while meeting other talented teens with similar backgrounds and interests.

85.19%  
of participants felt more likely to have a future career in the transportation industry.

31.03%  
had planned on involving transportation in their careers before the program began.

92.59%  
felt more encouraged to attend college after completing the program.

96.3%  
agree that the transportation industry has contributed greatly to solving problems found in the world.

92.59%  
rated the hands-on activities as above average. Many noted the activities as their favorite part of NSTI.

81.48%  
said they are 'Very Informed' about the different transportation career options.

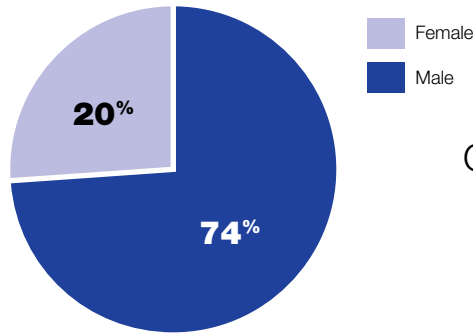
.....

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

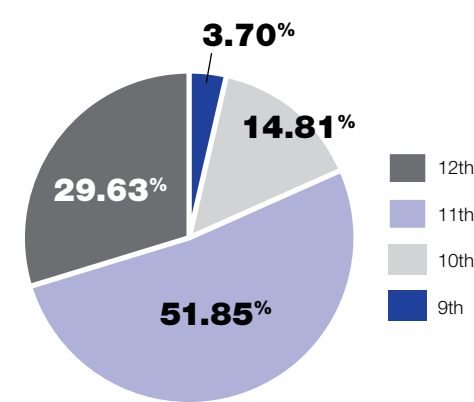
- 88.89% — Math
- 81.48% — Science
- 81.48% — Technology
- 62.96% — Transportation
- 57.69% — Design
- 44.44% — Shop

## DEMOGRAPHICS

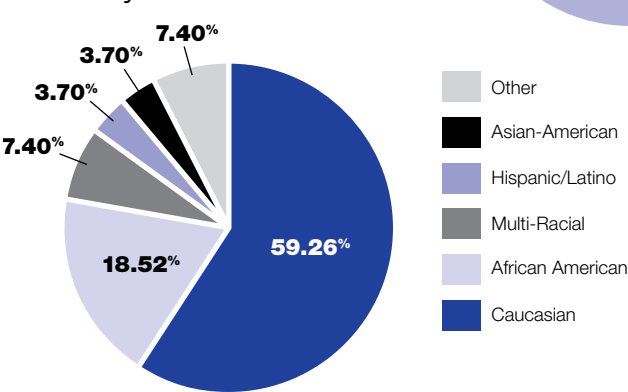
Gender



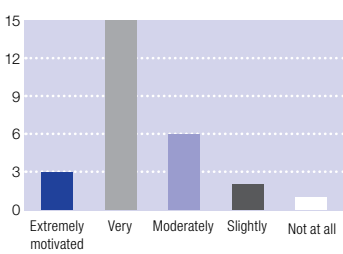
Grades in Fall 2013



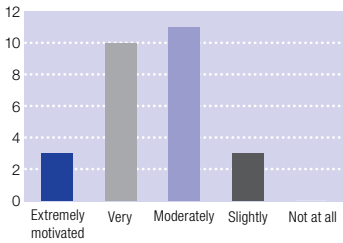
Ethnicity



PRE TEST: How motivated are you to learn about different fields in the transportation industry?



POST TEST: How motivated are you to learn about different fields in the transportation industry?



## PARTICIPANT COMMENTS

"Before this program I was sitting around the house wasting time. Here, every day is a new adventure."

"I've never learned so much about anything in the STEM field as quickly or as thoroughly as the transportation topics here in the program."

"This program was an amazing experience; when I went into this I knew almost nothing about bridges. Now being finished with this course I know about the field, what it's like, and how to design a successful bridge. This has taught me so much that I wouldn't have expected to learn, yet while having fun."





# Mind Trekkers



[mindtrekkers.mtu.edu](http://mindtrekkers.mtu.edu)

**f** FACEBOOK  
facebook.com/MindTrekks

**t** TWITTER  
twitter.com/mindtrekkers

**i** INSTAGRAM  
mindtrekkers

**Y**OUTUBE  
youtube.com/c/MichiganTechCPCO

The Mind Trekkers road show is Michigan Tech's traveling K-12 outreach initiative. The group brings the excitement of science, technology, engineering, and mathematics (STEM) 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 is inspiring our next generation of leaders to seek answers, get excited, and question the traditional boundaries of STEM education nationwide.

The Mind Trekkers student organization, founded in 2010, brings together current Michigan Tech students who are interested in sharing the excitement of STEM fields with middle and high school students across the country. The group—nearly 500 members strong—volunteers their time for road show demonstrations and performs at on-campus events, drawing attention to the group's unique hands-on science lessons. Mind Trekkers meets weekly to brainstorm, discuss, test new demonstrations, and prepare for upcoming events.

## 2014 OVERVIEW

14

events

7

states

from Louisiana to Washington D.C.,  
Minnesota to Tennessee

reached an audience  
of more than

139,000

people

## MIND TREKKERS ON CAMPUS AND IN THE COMMUNITY

2014

Orientation Week and  
K-Day

Preschool Fun Days

What is Mind Trekkers?

2015

Preschool Cabin Carnival,  
February 21

Meet the Mind Trekkers,  
March 29

Keweenaw Science &  
Engineering Festival,  
August 5–8

Michigan Tech Orientation  
Events, August 23–29

## LOOKING AHEAD

### 2015 Travel

JANUARY	Einstein Expo, Green Bay, Wisconsin
FEBRUARY	NWTC, Green Bay, Wisconsin
MARCH	Adventures in STEM, Houston, Texas, sponsored by Dow Chemical
APRIL	Door-Kewaunee Area Science and Engineering Festival, Wisconsin Lockheed Martin Family Day, Bethesda, Maryland FIRST Robotics World Championship, St. Louis, Missouri
MAY	Wausau Science & Engineering Festival, Wausau, Wisconsin
SEPTEMBER	Dow Great Lakes Bay Regional STEM Festival, Delta College, Michigan
OCTOBER	Mind Trekkers at Schoolcraft College, Livonia, Michigan Iron Range STEM Showcase, Virginia, Minnesota

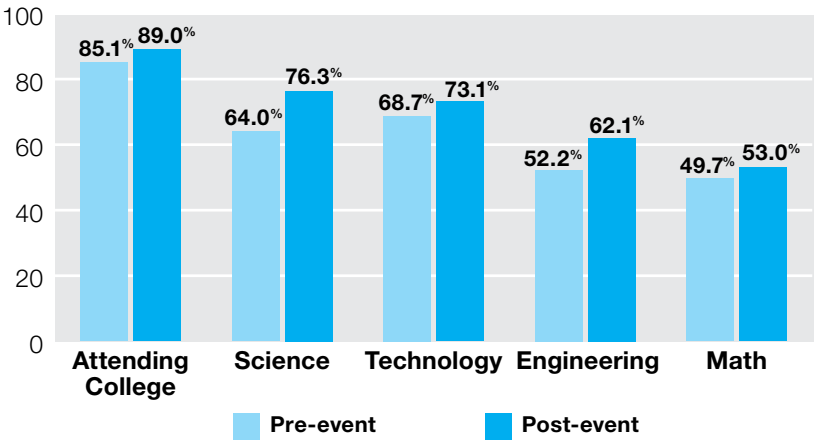
## PARTICIPANT COMMENTS

"I didn't know science could be fun until Mind Trekkers showed me it could."

"The science festival really changed me because it wasn't boring like sitting in a classroom for two hours learning. When you go to do Mind Trekkers, you are learning the same things, but you are really having fun and you're doing all the activities too."

"I didn't know before that sodas with less sugar float in water and sodas with more sugar sink in water. I loved it so much when I went with my school on Friday that I took my family and went again on Saturday."

## PERCENT OF STUDENTS INTERESTED BY SUBJECT\*



\*AT&T Sheboygan Science and Engineering Festival results



The Center for Pre-College Outreach has specific College Access programs that are 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 vary from visiting a small group of students at their school to discussing financial aid to bringing 200 middle school students to campus for a day. Some events happen once each year, while others consist of recurring visits, which allows the program to be unique for each audience.



## College Access



 **FACEBOOK**  
facebook.com/michigantechgearup

### GEAR UP

Michigan Tech partners with MI GEAR UP to provide pre-college programming through tutoring, mentoring, on-campus events, parent workshops, and teacher professional development. Our program assists 380 students in the graduating class of 2017 and works with eight local schools regularly. GEAR UP services range from homework help to college campus tours, family events to fun mentoring days. We also connect students to resources like financial aid information, admissions requirements, and standardized test preparation. Additionally, we offer several scholarships each summer to bring GEAR UP students to Michigan Tech's Summer Youth Programs—this gives students a chance to experience life on campus and make post-secondary education of all kinds feel achievable to all students.

77%

**of GU students surveyed feel knowledgeable about college entrance requirements after two years**

### Get WISE

On February 25, 2014, a total of 250 7th and 8th grade girls from the western Upper Peninsula spent the day at Michigan Tech, where they participated in a range of activities to connect them with the exciting, dynamic world of engineering. Each year, the participants compete in three challenges, which have included building a bridge with household materials and designing a miniature catapult. 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.



93%

**say the event made them think about math and science differently.**

94%

**plan on attending college in the future.**



### TiViTZ Tournament

A combination of checkers, logic, and arithmetic, Tivitz is a fantastic mental exercise. This year, the Center for Pre-College Outreach piloted a Math Day to go with Tivitz. On March 24, 2014, a total of 215 area students participated in several hands-on math activities about surfaces and game strategies, then wrapped up the day with a presentation on geometry in the real world. TiViTZ is made possible by continuing partnerships with the Western Upper Peninsula Center for Science, Mathematics, and Environmental Education and Michigan Tech's Department of Mathematical Science.

### Engineering Olympics

The 24th annual Engineering Olympics was held on March 25, 2014. This event challenged 92 students from six area high schools to work on projects throughout the school year—including trebuchets and mousetrap-powered vehicles using physics and engineering principles learned in school. The event provided a fantastic opportunity for 9th through 12th grade students to experience a day on campus while exercising their engineering skills in friendly competition. The event is put on with support from the Department of Engineering Fundamentals and the College of Engineering.



**ENGINEERING  
OLYMPICS**  
MichiganTech

### Lighthouse Learners

Lighthouse Learners is a program hosted at the Public Schools of Calumet, Laurium, and Keweenaw (CLK). Founded by Barbara and Paul Horton '69, Lighthouse Learners aims to make college a reality for those who participate. Currently, a small cohort of high school students from the class of 2018 are involved with the program. Lighthouse Learners focus on several areas of personal and academic development including service learning/community service, study skills and success, spiritual life, and building a connection to Michigan Tech.





## Sponsors



**DENSO**



**James L  
Van Camp**

**KOHLER**



Alliant Energy Foundation  
Thomas & April Alliston  
William A. Bertoldi Jr.  
Marilyn K Brouwer  
Consumers Energy  
Kara Doran  
GRW LLC  
John C. Guillian  
Greta Gunsher  
Saron Handy  
Hanson Professional  
Services

Michael & Judith  
Hendricksen  
Holiday Inn of Midland  
Michaelyn M Holmes  
Elizabeth Hoy  
Jasper Engineering &  
Equipment Company  
Joshua C Johnson  
Paul & Deborah Konzol  
Kraus-Anderson  
Construction Company  
Paige B. Lanthrop  
John & Jodi Lehman

Edward M. Leonard  
Mercury Marine  
Mesabi Nugget LLC  
Michigan Dept. of  
Transportation  
Miller Electric Manufacturing  
Company  
Mining Resources LLC  
NewCon Company  
PolyMet Mining Inc  
Darlene R. Pruess  
Eric & Christine Roberts  
Sargento Foods Inc

Schweitzer Engineering  
Laboratories Inc  
Stephen Scully  
Short Elliott Hendrickson Inc.  
Sigma-Aldrich Company LLC  
The Boldt Company  
United States Steel Corp  
Upper Peninsula Power  
Company  
Michiel & Lin Van Nieuwstadt  
Wisconsin Public Service  
Foundation

## Center for Pre-College Outreach Staff

**Cody Kangas**  
Director  
ckangas@mtu.edu

**Tom Maynard**  
Coordinator  
twmaynar@mtu.edu

**Rose Martell**  
Administrative Assistant  
rmmartell@mtu.edu

**Amanda McConnon**  
Assistant Director  
amccnonno@mtu.edu

**Liz Fujita**  
Coordinator  
eafujita@mtu.edu