

Transforming Middle School Workforce Development for 21st-Century Education

Project 2471
September 2024

Alverina Eka Weinardy and Lisa V. Rose

This report summarizes one of MTI's signature workforce development programs, the Garrett Morgan Sustainable Transportation Competition for middle school students, to increase understanding of the program's structure and impact and to provide insights for future improvements. In addition to documenting the value this program offers to stakeholders, including students, communities, and the transportation industries, this year's report also explains transformations we applied to adapt the program to the 21st century educational landscape. Furthermore, it acts as an archive of the year's unique transportation theme and prompts, and participating teams and their submissions.

ABOUT THE COMPETITION

History of the Competition

The Garrett A. Morgan Technology and Transportation Futures Program was established in 1997 by former U.S. Secretary of Transportation Rodney E. Slater to encourage young people to consider careers in transportation.

The program has three cornerstone components:

- To establish a partnership among the U.S. Department of Transportation, state departments of transportation, public and private transportation providers, and local communities to ensure that today's students are prepared to become the next generation of transportation leaders.
- To develop a curriculum that can interest younger students in transportation and provide learning tools that can guide them to advanced academic and professional levels.
- To provide the technologies that will enable students to develop skills they can apply to future careers in transportation.

Why We Started Hosting

The three cornerstone components of the program fully align with MTI's mission to increase mobility for all by improving the safety, efficiency, accessibility, and convenience of our nation's transportation system through research, education, workforce development and technology transfer. MTI's STEAM-focused (science, technology, engineering, art, math) workforce development programs encourage young people to pursue educational paths that prepare them for transportation careers through direct involvement with real challenges and solutions.

MTI has sponsored a competition every year since 2003 and over 1,300 students have participated. Today, the Garrett Morgan Sustainable Transportation Competition is open to middle school classes, clubs, after-school programs, and any other youth-serving organizations in the U.S.

Why We Continue to Host

Value of this Competition for the Student Participants

This program offers students the opportunity to develop practical skills, acquire insight into a critical national industry, build invaluable connections with industry professionals, and get a head start on their education by contributing a project for the chance to win a national competition.

Students can learn and hone STEAM-related skills just by participating in the competition. They begin with critical thinking and communication skills by forming a team, selecting a prompt, and proposing solutions. The specific project they work on can also help them practice science, engineering, art, and math while incorporating various technologies and thinking about the world in new ways.

While working on their projects, students gain new insights into the transportation systems that their communities rely on. For example, students have completed projects focusing on sustainability in road systems, leading them to learn about what materials are used in road construction and how transportation professionals consider wear and tear, weather, and other factors. Other student projects have looked at developing technology such as the internet of vehicles and autonomous vehicles and how these might transform the way we travel.

During the competition, students also connect with industry professionals. In these interactions, students build rapport and future networks to reach out to as they continue their education and career pathways, learning from people who have real-world experience in the professional world.

In a post-2023 competition survey, middle school participants most commonly selected “Exploring careers in transportation while solving real-world problems” and “Building my college and career portfolio and competency skills” in response to the “What made the competition a positive experience for you?” question.

Value of this Competition for the Communities

Workforce development must be a key part of any efforts to improve equity in our communities. Education, training, and other programs empower all community members to acquire new skills and hone existing ones to access opportunities, pursue their goals, and contribute to the economy and society.

Labor market inequality in the United States has grown substantially in the past few decades, especially noticeable in the dramatic increase in the earnings gap between workers with bachelor's degrees or higher and those with less education. According to the American Institutes for Research¹ (AIR), the earnings gap between these groups roughly doubled² between 1980 and 2000, and although the earnings of new college graduates have grown little since then, the gap between their earnings and those of individuals without these degrees has continued to widen.

Many communities have been left behind by the industry and by the economy more broadly, especially “people of color, new immigrants, individuals with disabilities, those living in rural and socio-economically segregated communities, and those involved with the criminal justice system.”³ Workforce development programs, especially those designed to reach these groups specifically, can succeed in closing the gaps and help empower people to access all kinds of opportunities.

Of 83 student participants in the 2023 competition, 46% were female. The racial and ethnic demographics of the team were also quite diverse, with several participants identifying as Hispanic/Latinx, American Indian or Alaskan Native, or multiple races. Historically underrepresented groups in transportation include Black, Indigenous, People of Color (BIPOC) communities and women. Workforce development programs like this one can reach individuals from these communities and encourage them to consider careers in the industry, thereby inspiring others from similar backgrounds to follow their career aspirations.

16 TEAMS | 83 PARTICIPANTS

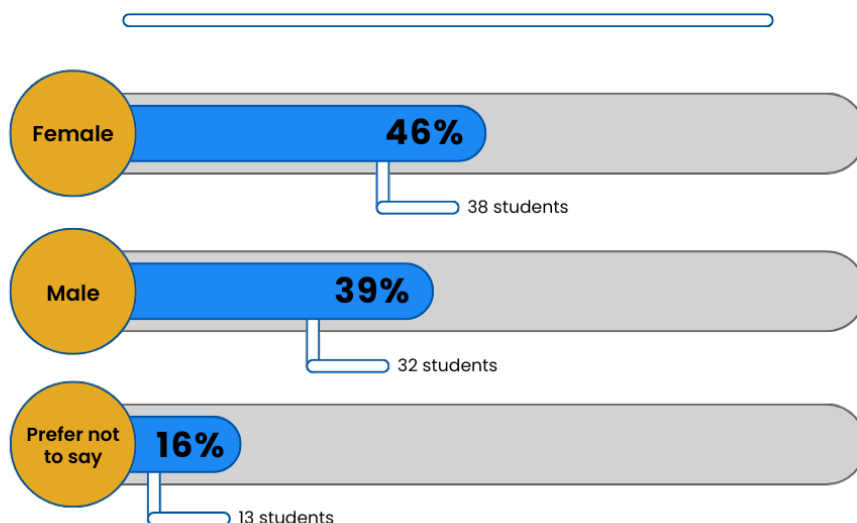


Figure 1. 2024 Competition Participants by Gender

By participating in the competition, students and their support members are also *directly* building community. They are forming teams that may continue beyond the competition as friendships and building rapport with professionals they can continue to look to as inspiration in years to come.

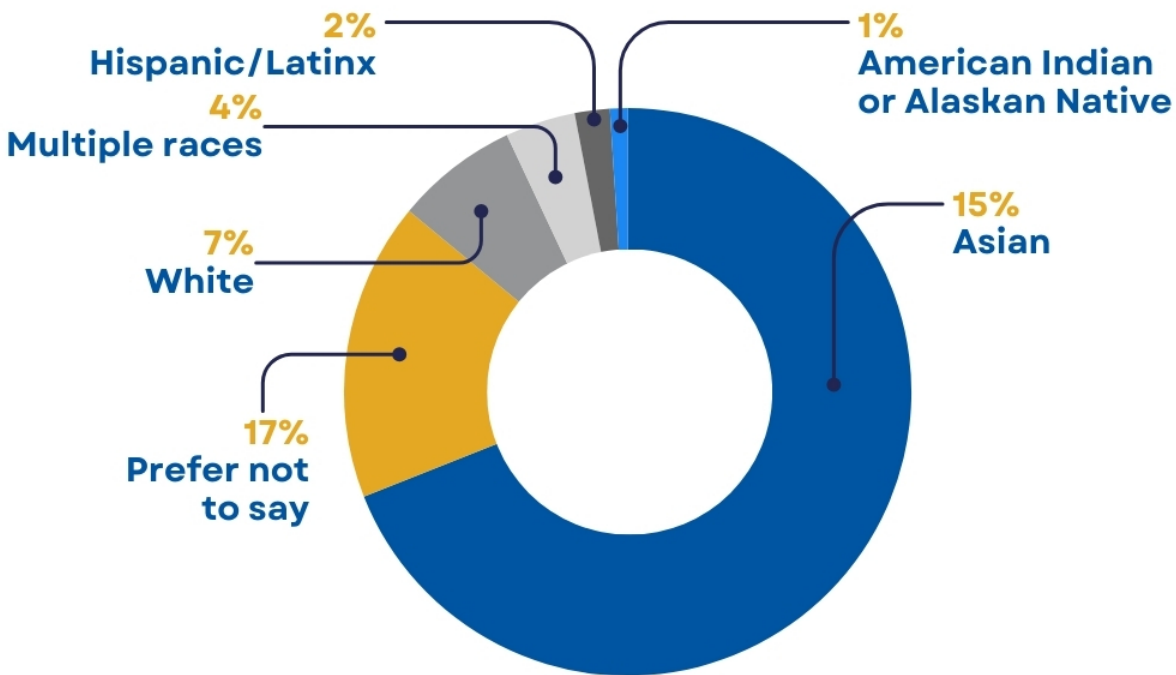


Figure 2. 2024 Competition Participants by Race/Ethnicity

Value of this Competition for the Transportation Industry

The entire transportation industry is hard pressed for workers with the skills essential to maintain the safety and efficiency of the nation’s transportation system and adapt to future changes. Workforce development is an important part of the solution. Programs like this competition are a key part of the strategy to ensure the transportation workforce is robust and able to meet the needs of the communities the industry serves.

The American Public Transportation Association⁴ (APTA) published a report⁵ in March 2023 outlining the “widespread and severe” transit workforce currently impacting the nation. According to this report, the main cause of this shortage is simply that the transportation sector has grown too quickly for the workforce to keep up. Economic conditions and the pandemic have exacerbated the problem. Additionally, the shortage is only expected to worsen as the current workforce retires—forty-three percent of transit workers are over age 55.

Historically, transportation agencies have struggled to hire and retain women as well, sometimes due to the perception of the field and gender bias, among other reasons, which further imposes limits on developing a talented workforce able to tackle pressing transportation challenges, including those related to rapidly developing technology and the impacts of climate change.

Federal, state, and local agencies are working hard to fill the workforce gap. In 2021, the Federal Transit Administration⁶ (FTA) awarded \$5 million in a cooperative agreement to the International Transportation Learning Center⁷ (ITLC) to support the Transit Workforce Center⁸ (TWC), which aims to help transit agencies recruit, hire, train, and retain a diverse workforce needed now and in the future. Over the previous decade, FTA has invested more than \$20 million in transit workforce development, funding

over 45 different grants to begin to overcome this critical shortage that—if left unaddressed—would leave the nation’s transportation infrastructure unable to meet the needs of millions of Americans.

In the post-competition survey for 2023, the vast majority of middle school participants responded that participating in the competition increased their interest in transportation-related careers and areas of study.

Workforce development programs like this competition help fill the workforce gap by exposing youth to the transformative power of transportation, encouraging them to pursue jobs in the industry, and helping them develop the skills needed to succeed in the workforce and to ensure the industry’s success.

2023-2024 VERSION OF THE COMPETITION

To increase participation and broaden the reach of the competition, several changes were implemented beginning with the 2023-2024 competition.

Background of Changes

The COVID-19 pandemic that rattled the country in 2020 caused major shifts in education. Globally, 168 million children⁹ were affected by schools closing sometimes for a year or more, including thousands of K-12 schools in the United States. According¹⁰ to the Centers for Disease Control and Prevention (CDC), between July 27, 2020–June 30, 2021, a total of 16,890 unique schools experienced an estimated 19,273 COVID-related school closures. Even when teachers could interact with students again, much of the education happened virtually and sometimes asynchronously. Research is beginning to show a nationwide learning gap in students who faced these challenges, possibly amplified by the general stresses of the pandemic from isolation and health concerns. Data¹¹ indicates that students in high-poverty school districts were affected more than students in higher-income ones, and existing achievement gaps only widened during the pandemic.

These conditions also led to administrative challenges for teachers, who often were left fighting to allocate limited time and resources, leaving little capacity to add the competition to their already tight curriculum. In the years following the pandemic, the competition thus experienced a decline in participation.

MTI’s Response: Significant Changes

In response, MTI staff began researching ways to address these challenges and other methods to make the competition more attractive and beneficial to educators and students. Simultaneously, MTI opened the competition to other team leads besides teachers in order to attract more participants. The competition is now open to team leads that come from other educational or community organizations, including the Boy Scouts and Girl Scouts, Rotary groups, religious institutions, etc. as well as parents of middle schoolers.

Staff also met with faculty from the San Jose State University Education Department to collaborate on further improvements. One resulting change was the hiring of a dedicated program liaison in

2023. The liaison works to bridge and maintain communication between MTI and participating teams, performs in-person recruitment efforts in the Bay Area, sends out weekly emails with resources for participants, facilitates meetings with industry mentors, and other related support tasks.

Changes were made to the competition's teacher guide as well. Namely, staff worked to align all sections of the guide to California Common Core Standards, ensuring a seamless integration of the competition into the teacher's curriculum. Common Core Standards,¹² which are "designed to ensure that students graduating from high school are prepared to take credit-bearing introductory courses in two- or four-year college programs or enter the workforce," are also the basis of K-12 curriculum in 41 states¹³ and the District of Columbia.

In the past iterations of the competition, MTI partnered with transit agencies to start team recruitment at the beginning of the second semester to prepare for the final presentation in April. This recruitment strategy was proven to be less than ideal for participants because it effectively provided two months of research and preparation, and it was more daunting for teams that did not meet in class every day. Starting in 2023, MTI staff completed email outreach to schools nationwide at the beginning of a new school year and promoted the use of the teacher's guide in class for broader participation. Staff also presented at events in San Francisco Bay Area, such as sciencepalooza!, Engineers Week, and Santa Clara County Environmental Literacy Summit, to promote the competition all year long.

To further enrich the students' experience, MTI began hosting a career night webinar. In this webinar, the Garrett Morgan competition teams and affiliated students joined MTI for insider insights into the excitement and challenges of cutting-edge transportation careers in high-speed rail and autonomous vehicles. Two guest speakers, Yaqeline Castro (Outreach and Student Engagement Specialist, California High-Speed Rail Authority) and Dan Pritchell (Policy Operations - Showcases Lead, Waymo) spoke to students about topics like which subjects in high school pave the way for exciting high-speed rail jobs, the toughest challenges faced by those working in autonomous vehicle technology companies, and more.

Additional Changes

In addition to opening the competition, adding a program liaison, and aligning content with Common Core Standards, MTI implemented additional changes to improve the competition and increase participation.

A \$500 honorarium for each of the first twenty team leads who registered was established. Another honorarium was implemented for industry mentors who meet with students. Depending on the time spent with students, mentors can earn up to \$200 for giving students the opportunity to interact with a professional in the field and offering constructive feedback on their project. MTI also provided an opportunity for high school students to collaborate with the teams as youth mentors. As youth mentors, these students advised the teams regarding the creation of project slides and videos, as well as research resources to build their proposed solution.

Finally, the competition no longer allows students to choose any project related to sustainable transportation. Instead, a unique theme and specific prompts are offered annually to help students

commit to an idea by eliminating time previously spent researching a topic and problem to solve. Each team is asked to choose one prompt that appeals to them the most, then the team lead submits a brief description about their proposed solution. From there, MTI staff identify professionals who may be the best fit to mentor the teams in preparing their submissions.

PROMPT



More than 43,000¹⁴ people die on roads in the U.S. each year and millions¹⁵ more are injured. Conventional viewpoints have held that collisions are an inevitable consequence of modern roads. However, armed with the right strategies, we can stop this trend and bring these grim statistics down to zero. This is #VisionZero2030¹⁶—a commitment to stopping traffic-related deaths and injuries by the year 2030.

Secretary of Transportation Pete Buttigieg called the number of traffic deaths a national crisis¹⁷. Last year, the Biden Administration gave \$5 billion to the Safe Streets & Roads for All¹⁸ to promote safety for all road users, especially vulnerable pedestrians and bicyclists. Despite these efforts, people are still dying—on average, four lives are lost every hour, every day, across the nation due to traffic collisions. The clock is ticking, and the time for action is now.

Teams, your task is to choose one of the prompts below and explore a solution that will bring your community closer to #VisionZero2030.

To learn more about Vision Zero, read A Primer on Vision Zero¹⁹ and Nine Components of a Strong Vision Zero Commitment²⁰ from Vision Zero Network.

1. What technological innovation could make roads safer and make transportation more sustainable? What would this innovation look like? Drone-based traffic enforcement? Automated traffic cameras? Self-driving cars? What would they cost to create and implement? How would they help roads become safer while also making transportation more sustainable? Choose one technology and explain how they contribute to both sustainable transportation and Vision Zero, the implications of using this technology, and how to implement it.
2. Imagine you're in charge of designing roads in your town. How can we improve the role of urban planning and infrastructure design to create safer roads? Provide 1-2 specific examples of how changes in road design can enhance safety. Consider materials & technology that would also contribute to reduce the impact of transportation on climate change.
3. Explore the intersection of safety and sustainability. If more people used more sustainable transportation options, would there be fewer traffic injuries and deaths? If more people walk and bike and use public transit, how can we keep them safe? How do we encourage more people to walk and bike? Propose a plan to 1) promote sustainable transportation options (e.g., a plan to get your community walking to school) and 2) how this plan fits in with Vision Zero.
4. Imagine you're in charge of \$5 billion for the Safe Streets & Roads for All project. How can you spend it to make transportation both safer and better for the planet? Devise a specific project for how to share and use the funds to meet Vision Zero goals and also lower the pollution from transportation.

PARTICIPANTS

List of Schools and Organizations

- Christa McAuliffe Middle School, Stockton, CA
- The Hamlin School, San Francisco, CA
- Juan Cabrillo Middle School, Santa Clara, CA
- Julius Cordes Elementary School, Mountain House, CA
- Kennedy Middle School, Cupertino, CA
- Peter Hansen Elementary School, Mountain House, CA
- Shawnee Middle School, Shawnee, OK
- Silicon Valley Monterey Bay Council
- Tom Matsumoto Elementary School, San Jose, CA
- Troop 492 - Silicon Valley Monterey Bay Council
- Troop 492 - Cupertino Rotary Club
- Thornton Middle School, Fremont, CA
- William Hopkins Middle School, Fremont, CA (Note: four teams led by four different team leads participated from this school)

LIST OF CHOSEN PROMPTS, PROJECT DESCRIPTION

1. Christa McAuliffe Middle School

Team Lead: Samantha McCoy

City & State: Stockton, CA

Prompt: Prompt 3 - Explore the intersection of safety and sustainability

Project Title: Sustainable Transportation

Project Description: This project creates a route to improve safety and sustainability by encouraging the use of school buses and decreasing the chances of collisions caused by the chaos of many personal vehicles driving on school grounds.

2. The Hamlin School

Team Lead: Julia Fiedler-Ross

City & State: San Francisco, CA

Prompt: Prompt 2 - Imagine you're in charge of designing roads in your town

Project Title: Rumble Strip Installation in San Francisco

Project Description: This project aims to install rumble strips next to bike lanes in order to prevent collisions with vehicles. By encouraging safe bicycle routes, the project also encourages the use of sustainable transportation.

3. Juan Cabrillo Middle School

Team Lead: Michelle Scilingo

City & State: Santa Clara, CA

Prompt: Prompt 4 - Imagine you're in charge of \$5 billion for the Safe Streets & Roads for All

Project Title: Street Safe

Project Description: This project uses existing technology to help alert pedestrians to vehicle traffic, thereby improving safety and encouraging the use of sustainable transportation modes like walking and cycling.

4. Kennedy Middle School

Team Lead: Sharon Larson

City & State: Cupertino CA

Prompt: Prompt 2 - Imagine you're in charge of designing roads in your town

Project Title: Hexa-Grooves

Project Description: This project uses "Hexa-Grooves" to increase safety by decreasing speed and increasing good traffic flow.

5. Peter Hansen Elementary School, Julius Cordes Elementary School

Team Lead: Sanjeev Agarwal

City & State: Mountain House, CA

Prompt: Prompt 1 - What technological innovation could make roads safer and make transportation more sustainable?

Project Title: DriveLink: The Platform Connecting Thousands of Vehicles Every Day

Project Description: This project proposes the use of DriveLink, a technological innovation that will make roads safer and more sustainable by enabling vehicles to communicate information in real-time to each other.

6. Shawnee Middle School

Team Lead: Dr. Carrie Miller-DeBoer

City & State: Shawnee, OK

Prompt: Prompt 3 - Explore the intersection of safety and sustainability

Project Title: Let the Sun Lead Your Way

Project Description: This project proposes using the Rails to Trails program and adding solar charging stations for microtransit to encourage more people to use sustainable, alternative modes of transportation like e-bikes and e-scooters.

7. Silicon Valley Monterey Bay Council

Team Lead: Preeti Raman

City & State: San Jose, CA

Prompt: Prompt 1 - What technological innovation could make roads safer and make transportation more sustainable?

Project Title: A Vision for a Smart, Sustainable, and Safe Transportation Infrastructure System

Project Description: This project proposes the creation of a smart, self-managed road safety infrastructure system to reduce and eliminate crashes and emissions, save lives, and reclaim time. It also proposes developing future-optimized safety solutions and regenerative walkable, urban landscapes where energy is generated by clean sources.

8. Thornton Middle School

Team Lead: Lisa Oliver

City & State: Fremont, CA

Prompt: Prompt 3 - Explore the intersection of safety and sustainability

Project Title: Thornton Middle School Sustainable Transportation and Safety Study

Project Description: This project conducts and uses the results of a traffic safety audit to improve safe student commuting, prioritizing reducing car traffic on campus via increased use of alternative modes. Safety and sustainable transportation recommendations will be presented to Thornton community stakeholders for implementation.

9. Thornton Middle School - STEM Girls

Team Lead: Antoinette Schlobohm

City & State: Fremont, CA

Prompt: Prompt 3 - Explore the intersection of safety and sustainability

Project Title: Small Actions Can Have a Significant Impact!

Project Description: This project educates the community about the opportunities available to them and shows the small changes individuals can make to their daily habits. The community learns about the synergistic impacts of these small actions when it comes to the benefits of sustainable transportation.

10. Tom Matsumoto Elementary School

Team Lead: Sushma Venkatayogi

City & State: San Jose, CA

Prompt: Prompt 1 - What technological innovation could make roads safer and make transportation more sustainable?

Project Title: Safety Drones

Project Description: The project addresses sustainable transportation by using drones to monitor and reinforce traffic safety.

11. Troop 492, Silicon Valley Monterey Bay Council

Team Lead: Sreelatha Chigurupati

City & State: Sunnyvale CA

Prompt: Prompt 2 - Imagine you're in charge of designing roads in your town

Project Title: Urban Planning and Infrastructure

Project Description: This project uses urban infrastructure to help improve road structure and pedestrian safety to minimize the deaths caused by traffic. It uses carpool lanes to minimize pollution, and improved flyovers to reduce congestion so people can reach their destinations faster.

12. Troop 492, Cupertino Rotary Club

Team Lead: George Denise

City & State: Saratoga CA

Prompt: Prompt 1 - What technological innovation could make roads safer and make transportation more sustainable?

Project Title: Smart Traffic Lights

Project Description: This project shows that smart traffic lights are the technological innovation needed to make transportation more convenient and sustainable. Smart traffic lights minimize idle time and make the most of traffic flow efficiency. Emissions from cars are reduced by every vehicle moving at a steady pace, making a healthier environment.

13. William Hopkins Middle School - Team A

Team Lead: Randa Matar

City & State: Fremont, CA

Prompt: Prompt 1 - What technological innovation could make roads safer and make transportation more sustainable?

Project Title: AI-Powered Transportation

Project Description: This project increases road safety by eliminating the variable of human error by bringing in AI to replace humans on roads. The project addresses sustainable transportation because in order to run an AI trip computer in vehicles, a switch to battery power would be necessary.

14. William Hopkins Middle School - Team B

Team Lead: Menaka Aradhya

City & State: Fremont, CA

Prompt: Prompt 3 - Explore the intersection of safety and sustainability

Project Title: Protection of Earth and Prevention of Harm

Project Description: This project uses an app to help persuade and push people to make choices that benefit the environment and communities. The app uses a credit system to motivate people to strive towards Vision Zero.

15. William Hopkins Middle School - Team C

Team Lead: Josephine Hilton

City & State: Fremont, CA

Prompt: Prompt 2 - Imagine you're in charge of designing roads in your town

Project Title: Porous Asphalt Research for Applications and Improvements

Project Description: This project implements sustainable changes in road designs by investing in technologies that can nullify the cons of porous asphalt, such as chemicals leaking in through the road. The project addresses sustainable transportation because porous asphalt requires less maintenance than normal asphalt and lasts longer.

16. William Hopkins Middle School - Team D

Team Lead: Suparna Bhaumik

City & State: Fremont, CA

Prompt: Prompt 2 - Imagine you're in charge of designing roads in your town

Project Title: Protecting Pedestrians at Night

Project Description: This project is based on finding solutions to make American roads safer and less deadly for pedestrians, particularly at night. The project offers timely, economical, and easy-to-implement crosswalk solutions using luminescent signage, sensor technology, and a driverless mini shuttle all powered by reusable energy to improve both safety and sustainability.

COMPETITION RESULTS

The sixteen submissions²¹ were scored by a panel of three judges from the transportation industry. Each team can score a maximum point of 130 based on the following criteria:

- Organization (15 points)
- Content (45 points)
- Presentation (40 points)
- Overall Fit with Competition Goals (30 points)

In the first place, Kennedy Middle School from Cupertino, California, scored 116 out of 130 with their project “Hexa-Grooves for a safer future.”²² William Hopkins Middle School - Team D from Fremont, California, followed with a score of 112.67 for their project entitled “Protecting Pedestrians at Night.”²³ In third place, the Peter Hansen and Julius Cordes Elementary Schools team from Mountain House, California, was awarded 106.67 points for their project “DriveLink - The Technology connecting thousands of cars daily.”²⁴

The top three winners were announced in a virtual award ceremony featuring USDOT’s Office of Research, Development and Technology Director, Dr. Firas Ibrahim, as the keynote speaker.

CONCLUSION

Feedback from those involved in the 2024 competition demonstrates several positive trends. Teams valued the support from both professional mentors and youth mentors. Having the youth mentor was especially beneficial, as it fostered relatable connections for the students. Feedback also showed that the ongoing communication from MTI, including the bi-weekly emails sent by the liaison, helped keep participants engaged and on track. Additionally, Career Night and the in-person delivery of awards and certificates were also well received. Finally, educators appreciated the changes made to align program materials with their curriculum. Overall, feedback indicates the program effectively facilitated meaningful connections and practical learning opportunities.

Further improvements for the next competition are already underway, with a focus on improving the utility of available materials, adding more resources, and increasing efforts to extend reach and increase participation rates. The competition’s landing page²⁵ has been revamped for visual appeal and readability. A glossary of terms (e.g., youth mentor) has been added, as well as links to new resources such as competition-specific communications templates and frequently asked questions. This competition will continue to evolve to meet the needs of students and the industry in order to improve mobility for all.

Endnotes

1. <https://www.air.org/>
2. <https://www.air.org/sites/default/files/WDEMP-Importance-of-Workforce-Development-Brief-April-2021.pdf>
3. <https://www.air.org/sites/default/files/WDEMP-Importance-of-Workforce-Development-Brief-April-2021.pdf>
4. <https://www.apta.com/>
5. <https://www.apta.com/research-technical-resources/research-reports/transit-workforce-shortage/>
6. <https://www.transit.dot.gov/>
7. <https://www.transportcenter.org/>
8. <https://www.transitworkforce.org/>
9. <https://www.unicef.org/press-releases/schools-more-168-million-children-globally-have-been-completely-closed>
10. https://wwwnc.cdc.gov/eid/article/30/1/23-1215_article
11. <https://www.gse.harvard.edu/ideas/news/24/01/despite-progress-achievement-gaps-persist-during-recovery-pandemic>
12. <https://www.thecorestandards.org/>
13. <https://www.thecorestandards.org/about-the-standards/frequently-asked-questions/>
14. <https://www.transportation.gov/briefing-room/following-new-data-showing-traffic-fatalities-remain-persistently-high-usdot>
15. <https://injuryfacts.nsc.org/motor-vehicle/overview/introduction/>
16. <https://visionzeronetwork.org/about/what-is-vision-zero/>
17. <https://apnews.com/article/traffic-deaths-distracted-driving-crisis-6db6471e273b275920b6c4f9eb7e493b>
18. <https://www.transportation.gov/grants/SS4A>
19. https://visionzeronetwork.org/wp-content/uploads/2018/05/What-is-VZ_FINAL.pdf

20. <https://visionzeronetwork.org/wp-content/uploads/2018/05/VZN-9-Components.pdf>
21. <https://youtu.be/YYmCvimHgn4>
22. <https://youtu.be/gImFIFQFvZw>
23. <https://youtu.be/p0ACuByhMRE>
24. <https://youtu.be/2nmdlfGvEiY>
25. <https://transweb.sjsu.edu/workforce-development/garrett-morgan-program>

Acknowledgments

Thank you to Susan Vinh, MTI Program Liaison, for her invaluable effort in recruiting teams in the Bay Area. Thank you to the U.S. Department of Transportation (DOT), the California Department of Transportation (Caltrans), and other industry partners who make the Garrett Morgan Sustainable Transportation Competition possible. Thank you to MTI Graphic Design Assistant Katerina Earnest for her indispensable assistance with this publication. A special thank you to the 2024 student participants, educators, parent volunteers, youth mentors, and professional mentors.

About the Authors

Alverina Weinardy first joined MTI as a graduate student research assistant in 2017, and returned as Public Programs Coordinator in 2022. Currently, she serves as MTI's Director of Operations. Alverina plays a vital role in the execution of MTI's workforce development programs and other public-facing events. She has successfully delivered a variety of K-12 programs, including the Mineta Summer Transportation Institute, Garrett Morgan Sustainable Transportation Competition, Elementary Poster Contest, and Mineta Essay Contest, by leveraging industry partnerships.

As MTI's Editor and Writer since 2020, Lisa Rose ensures all of MTI's written communication is concise, effective, and accessible. She helped write the grant application for the Mineta Consortium for Equitable, Efficient, and Sustainable Transportation, led by MTI, which was awarded \$10 million in federal funding and \$5 million from regional and state partners. With an MA in English from SJSU, Lisa dedicates herself to using language to advance equity in transportation, education, and every space she can influence.

This report can be accessed at
<http://transweb.sjsu.edu/research/2471>



MTI is a University Transportation Center sponsored by the U.S. Department of Transportation's Office of the Assistant Secretary for Research and Technology and by Caltrans. The Institute is located within San José State University's Lucas Graduate School of Business.