NATIONAL TRANSPORTATION CENTER

2014 Fall TEACHER TRANSPORTATION INSTITUTE

prepared for the

Mid-Atlantic University Transportation Center
and
Connected Vehicle/Infrastructure University Transportation Center

2014 Fall Teacher Transportation Institute

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5. Project Duration:
   October 4, 2014 – November 22, 2014

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Introduction

The Fall Teacher Transportation Institute (TTI) at Morgan State University was implemented on Saturdays from October 4, 2014 to November 22, 2014. Seven teachers attended the Saturday sessions. In addition to the Saturday sessions, the teacher teams met during the week for two hours. The two-hour sessions were used by the teachers to conduct research and plan for the final project presentations. The teachers were given a pre-program survey to determine their expectations of the TTI professional development. It also established what the teachers knew about transportation and transportation-related careers.

TTI participants discussed what STEM is and its importance to post-secondary education and successful careers in transportation and related fields. The program engaged the teachers in hands-on, inquiry-based lessons that included the use of engineering principles, design and technology. The teachers visited transportation and transportation-related work sites to become familiar with current trends in transportation. They gained insights into careers and the work environment of engineers, transportation planners, information technology professionals and social scientists in the transportation industry. Guest speakers also discussed opportunities and careers in the transportation industry.

Participants discussed the impact of the traffic roundabout and connected vehicles on the environment and safety. Participants conducted traffic feasibility studies and used scientific and mathematical principles to analyze their data. They were taught to construct a scale of a traffic roundabout. The teachers became more aware of the hazards of distracted driving when they got behind the wheel of a car simulator.

The TTI participants received Continuing Education Units (CEUs) from Morgan State University's Center for Professional Development and Continuing Studies for attending the TTI. The CEUs will be used by the teachers for recertification of teaching credentials and/or promotion.

Goals and Objectives

STEM and Workforce Development:

- Provide teachers an opportunity to become aware of the connection between STEM, transportation and related careers.
- Research and explore STEM careers associated with transportation
- Underscore the importance of STEM education to students and parents
- Develop teachers' awareness of transportation as an option for post-secondary education and career path

- Conduct research on transportation careers, modern traffic roundabouts and connected vehicles

Distracted Driving

- Provide an opportunity for TTI participants to use the Car Simulator at Morgan State University's transportation department. It provided a virtual environment and simulation demonstration that features roadways complete with safety hazards
- Discuss statistics associated with distracted driving
- Discuss if connected vehicles will help drivers to be less or more distracted
- Teams will develop a distracted driver PowerPoint presentation that emphasizes the danger of a distracted driver

TTI Partnerships

The Maryland Department of Transportation (MDOT) supported the TTI by providing guest speakers. The speakers spoke to the teachers about the construction, location and design of roundabouts in Maryland. The teachers also received presentations from engineers from the Baltimore City Department of Transportation (BCDOT). They spoke to the teachers about proposed roundabouts in the city and they reviewed the results of the teachers' traffic studies with them. Teachers were told about the process that engineers use to determine the type of roundabout that will be constructed for specific locations.

Each of the presenters spoke to the teachers about their own careers and how they prepared for them. Staff from Morgan State University's Department of Transportation and Urban Infrastructure Studies presented to the teachers about preparing their students for post-secondary education and the requirements for careers in the transportation industry. The teachers received a tour of the Center for the Built Environment Infrastructure Studies (CBEIS) which houses the transportation department at Morgan State University. They saw the latest technology used by transportation professionals and the labs used to conduct transportation research. The tour guide elaborated on the type of instruction and guidance that is provided to develop transportation professionals.

Accomplishments

The Common Core State Standards (CCSS) in Math, Science and Engineering education emphasize core disciplinary ideas and interdisciplinary approaches to learning. TTI provided an opportunity for STEM teachers to use Math, Science, and Technology and Engineering education to emphasize core ideas that support the process of learning in their students. The teachers were taught to go beyond the basics of what students need to know into what engineers do to approach a new problem. They were encouraged to allow their students to solve difficult problems using engineering methods and better communicate their ideas to others.

The teachers were placed in project teams to complete assignments. They conducted computer and field research, collaborated and participated in panel discussions with their colleagues about STEM education. Discussions were held about their current teaching methodologies and strategies and the changes that they would make to improve student success in STEM.

During each session teacher teams presented to the cohort on specific topics such as current STEM research, connected vehicles, transportation careers and the modern traffic roundabouts. TTI participants wrote in journals about their experiences at the end of each class session. Journaling was used to give the teachers an opportunity to reflect on what they learned and any new transportation and STEM insights. The final project required the teachers to construct a scale of a modern traffic roundabout and create a PowerPoint presentation on an assigned transportation career or a related career. The teachers included in their reports how they will assimilate the strategies and new teaching methodologies into their daily lesson plans.

The teachers completed post program surveys, and the results indicated that the teachers feel more equipped to teach their students to be successful in STEM areas through hands-on, inquiry-based learning. Most of the teachers agreed that they are more aware of the careers and opportunities that are available to their students in the transportation industry than they were before they attended the TTI.

Outcomes

Teachers were able to learn strategies using engineering principles to teach their students to become critical thinkers and problem solvers. They became aware that in the 21st century the ability to master subject matter is not enough for post-secondary and career success. The TTI participants discussed the need for high-functioning skill sets in the higher education programs and in the workplace. They concluded that their students will need to have the ability to apply knowledge and skills across disciplines and realized how critical this will be to the demands of the transportation industry.

The teachers will use the activities from the TTI to encourage students to ask questions, and help students explore ways to answer them. Participants were taught to help their students strategically process and synthesize information and be willing to share the results with their peers. The teachers also learned how to help their students reflect on their learning experiences through journaling. The teachers were given information about how to connect their students to information about careers in transportation and related careers by exploring transportation and engineering websites such as http://fastforward.unl.edu/index.html, which highlights careers in transportation. The TTI participants stated that they will encourage their students to consider careers in the transportation industry. The teachers have knowledge of current technology and the opportunities available to students in the transportation industry and related fields.
The teachers demonstrated their understanding of the interdisciplinary nature of STEM. The teachers:

1) constructed a scale model of a modern traffic roundabout,

2) conducted presentations about modern traffic roundabouts and their research,

3) reported on the results of their teams' traffic feasibility study,

4) explained how strategies and principles learned in the TTI will be implemented into their classrooms using an interdisciplinary approach to learning,

5) provided descriptions of new teaching strategies and methodologies gleaned from the TTI and the teachers

6) completed a post program survey to determine if the TTI met their expectations.

The teachers know how to use STEM principles to design and construct a scale model of a traffic roundabout. They are able to explain and discuss how STEM areas impact the transportation industry, workforce and the economy. They are knowledgeable about careers in transportation and what is required of the 21st-century workforce in STEM-area careers. They have become aware of the types of roundabouts in Maryland, and their impact on safety and the environment**.** The teachers know the impact of connected vehicles on safety and the rising cost of insurance.

Conclusions

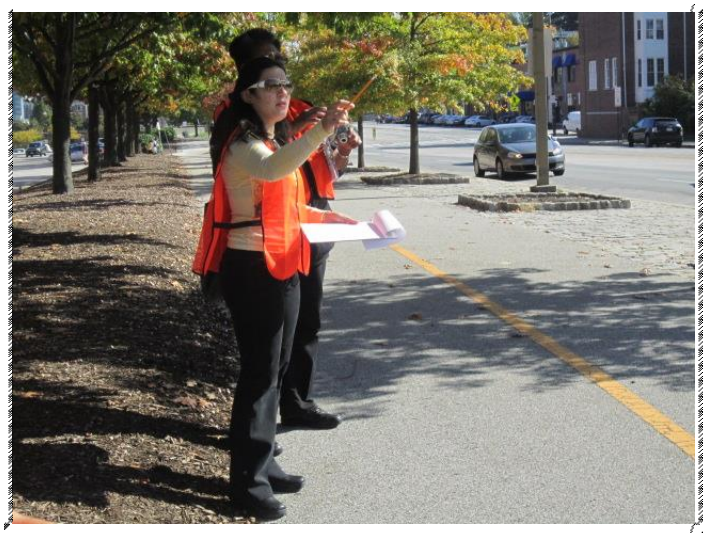
The teachers plan to use the construction of the modern traffic roundabout in their classrooms to inform their students about why STEM is necessary to be successful in post-secondary institutions, transportation and related careers. They want to initiate discussions with their students about the driving simulator, modern traffic roundabouts, and connected vehicles to emphasize safe driving and STEM efficiency. They emphasized that they will be able to use transportation projects to encourage their students' aptitude in STEM through hands-on inquiry. The teachers indicated that they will use a variety of transportation websites to introduce their students to transportation and related careers. The teachers came to the following conclusions about STEM and what is needed to improve STEM education in their schools:

- Providing teachers with current technology that is used in the workplace may improve learning outcomes in STEM.
- Speaking to students early in their educational process about career choices will help teachers identify resources to help students prepare for STEM careers.
- Plan to add transportation as a separate focus in STEM seminars/fairs at their schools.
- The teachers think that more programs like TTI should be offered so that they are more informed about the STEM careers available to their students.
- Principals should be more flexible and listen to their teachers and potential employers about what students need to be successful in post-secondary education institutions.
- Plan to dedicate a professional development activity to professional development meetings to enhance their colleagues' awareness of career and education opportunities in transportation.

Appendix A: 2014 Fall TTI PHOTOGRAPHS

Teachers conducting traffic feasibility studies at a roundabout site.

The teachers visit the site of an existing roundabout.



The teachers tour the Smithsonian's America on the Move exhibit.

Final touches on roundabouts

The Teachers prepare for final project presentations of their roundabouts

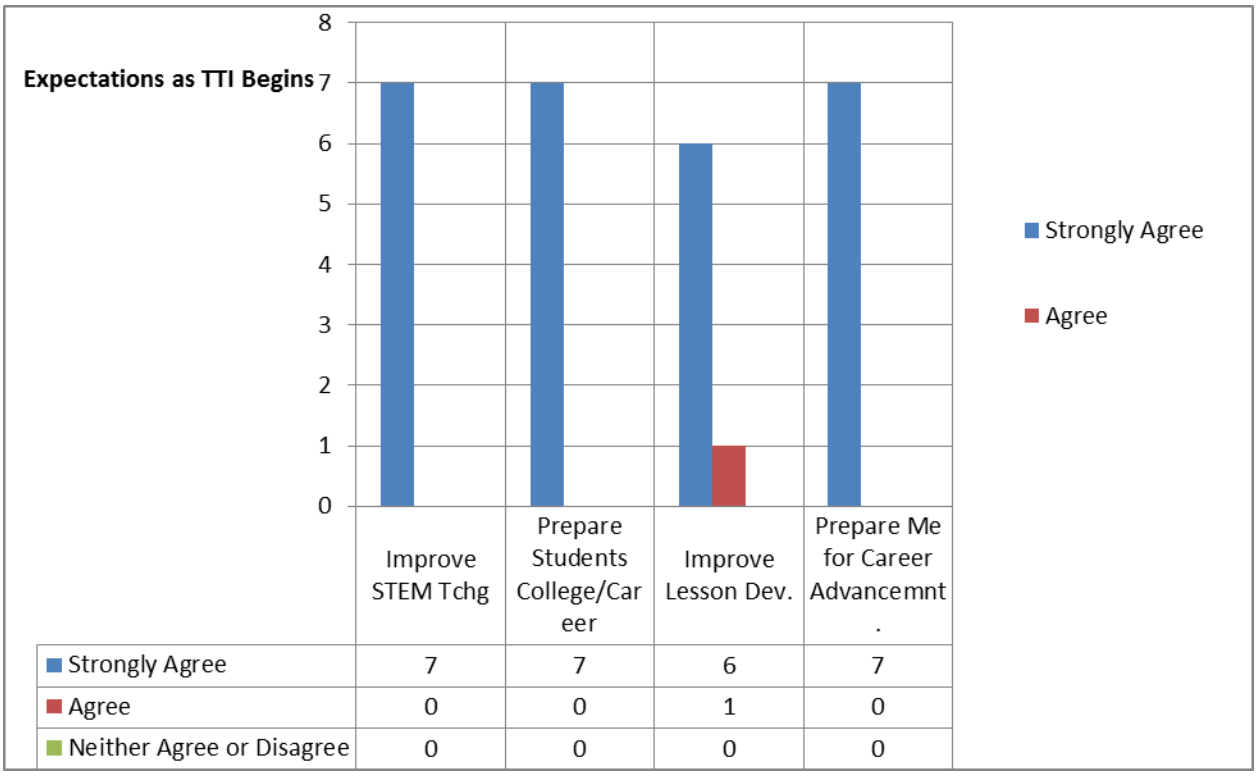
Project presentations are conducted on the last day of the TTI

On the last day of the program, one of the teachers surprised the cohort with a roundabout cake.

Appendix B: Pre/Post Survey Results

Pre Survey Results

A majority of the teachers felt that the TTI program would help to improve their ability to teach STEM and make their students aware of career and educational opportunities in transportation.



Post Survey Results

All of the teachers indicated that overall the TTI has helped them to improve their teaching skills in STEM areas. They also felt that the TTI made them aware of career opportunities for their students.