



**NATIONAL TRANSPORTATION CENTER
2015 SUMMER TEACHER TRANSPORTATION INSTITUTE**

Final Report

prepared for the

**Mid-Atlantic Universities Transportation Center
and
Connected Vehicle/Infrastructure Transportation Center**

**Morgan State University
2015 Summer Teacher Transportation Institute**

1. Proposal Title: Morgan State University Teacher Transportation Institute
2. Submitted By:
Dr. Z. Andrew Farkas
Organization: National Transportation Center, Morgan State University
Role on Project: Director
Email: andrew.farkas@morgan.edu

Phone: 443-885-3761
3. Key Personnel:
Name/Title: Valencia D. Baker
Organization: Morgan State University
Role on Project: Education Program Coordinator
Email: valencia.baker@morgan.edu
Phone: 443-885-3969
4. Lead Instructor: Safieh Laaly, Ph.D., RLA
5. Project Duration:
May 15, 2013 – July 29, 2015

Table of Contents

INTRODUCTION	4
GOALS AND OBJECTIVES	4
TTI PARTNERSHIPS	5
ACCOMPLISHMENTS	5
OUTCOMES	6
CONCLUSIONS	7
APPENDIX:	
A. 2015 TTI PHOTOGRAPHS	
B. PRE/POST SURVEY RESULTS	

Introduction

The Teacher Transportation Institute (TTI) at Morgan State University was implemented from July 13, 2015 to July 29, 2015. The professional development took place over a two-week period. The session was used by the teachers to conduct research and plan for the final project development and 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. One participant, a school counselor, registered for the TTI to become more informed of career and educational opportunities in the transportation industry for her students. Teachers who are more informed about the connection between STEM and the transportation industry and are aware of the trends in transportation and safety developments can communicate career opportunities available to their students.

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 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 also experienced driving scenarios behind the wheel of a driving simulator and became more aware of the hazards of distracted driving.

The TTI participants received Continuing Education Units (CEUs) from Morgan State University's Center for Professional Development and Continuing Studies for attending the entire program. 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 connections 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 Driving 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
- 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 Baltimore City Department of Transportation (BCDOT) engineers. 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 instruction and guidance that are 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 for 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 their colleagues on specific topics, such as current STEM research, connected vehicles, transportation careers, and 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. To construct the roundabouts the teachers used tools such as Computer Aided Design (CAD) software and triangular rulers. They also included in their reports how they will incorporate strategies and new teaching methodologies into their daily lesson plans. The journals and reports were relied upon to provide the information on outcomes and conclusions reported here.

The teachers completed post program surveys (page 16), 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 higher education programs and in the workplace. They concluded that their students must 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.

During the final week of the TTI, 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.

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-related 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.

Conclusions

The teachers stated 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. They plan to initiate discussions with their students about the driving simulator, modern traffic roundabouts, and connected vehicles to emphasize safe driving and STEM. One teacher thought that he might consider an after-school activity with a transportation focus. The teachers came to the following conclusions about STEM and what is needed to improve STEM education in their schools:

- Speaking to students early in their educational process about career choices will help teachers identify resources for students to prepare for STEM careers.
- The teachers think that more programs such as TTI should be offered so that they are more informed about various STEM careers available to their students.
- School administrators should be more flexible and listen to their teachers and potential employers about what students need to be successful in post-secondary education institutions.
- Parents should be taught why STEM exposure is important to their students' post-secondary education success.
- Post school activities should focus on career goals for students.

Appendix A: 2015 TTI Photographs



The teachers discuss their findings at the site of a proposed roundabout.



The teachers' instructor discussed some of the traffic patterns that can be found during the traffic feasibility study.



The teachers begin the process of designing the roundabout according to the scale provided by the instructor.



Teams work on their roundabout designs.



Team A – Roundabout Design



Team B – Roundabout Design





The teachers visited the Maryland Department of Transportation (MDOT) to learn about roundabout signage and other, traffic signs in Maryland. They also spoke with staff about career opportunities.

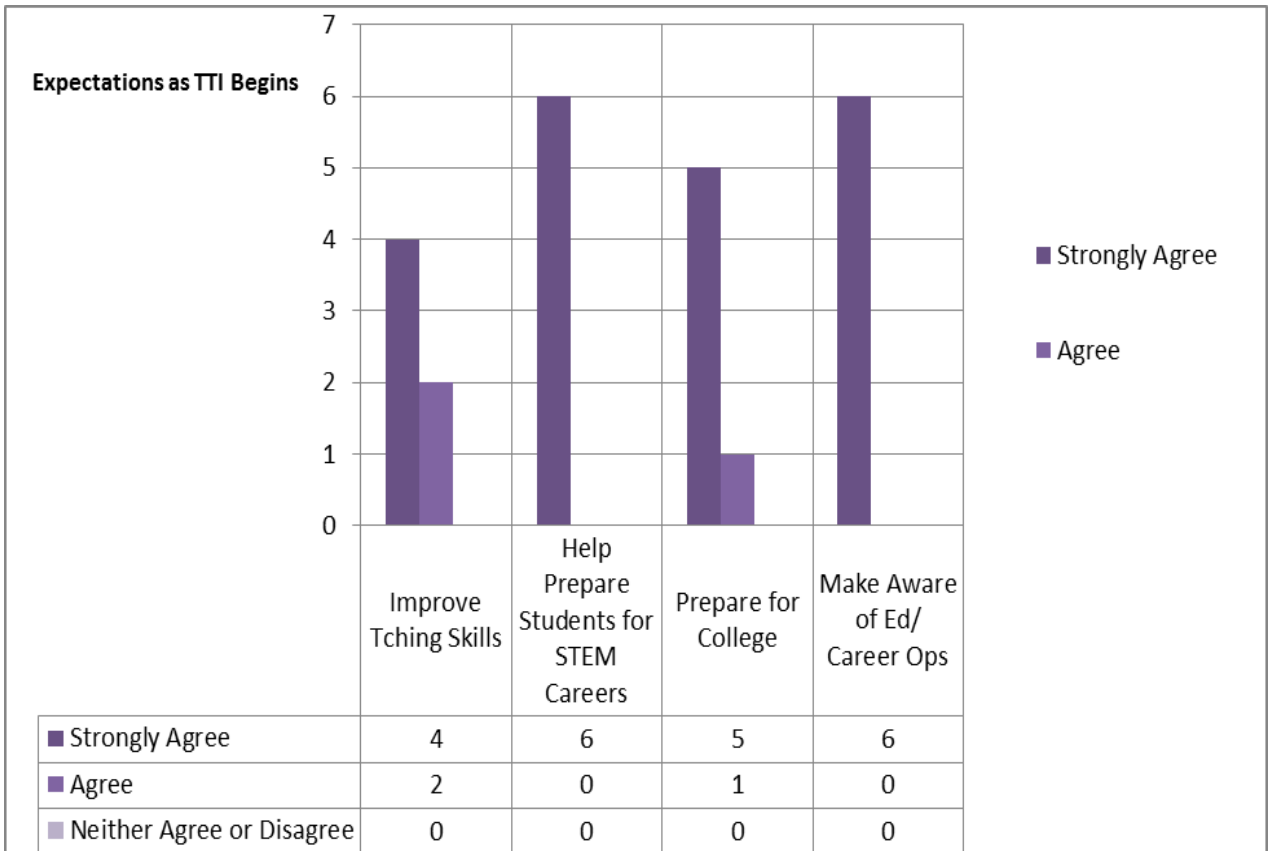


On the final day of the TTI the teachers shared their PowerPoint presentations with invited guests.

APPENDIX B: PRE/POST SURVEYS

PRE-SURVEY

On the first day of the TTI the teachers took a survey to express their expectations for the outcome of the program. Four out of six teachers strongly agreed that the program will improve their teaching skills.



POST SURVEY

The results of the post survey indicate that one more teacher strongly agreed that the TTI helped them to improve their teaching skills in STEM areas. All of the teachers indicated that they are more aware of educational and career opportunities in the transportation industry.

