

Rowan University

## Rowan Digital Works

---

Henry M. Rowan College of Engineering Faculty  
Scholarship

Henry M. Rowan College of Engineering

---

7-26-2021

# Long Term Impact of New Jersey National Summer Transportation Institute Hosted at Rowan University on Career Choices of Cohorts (Evaluation)

Kristine Rivera

Ayman Ali

Yusuf Mehta

*Rowan University*, [mehta@rowan.edu](mailto:mehta@rowan.edu)

Shivani D. Patel

Follow this and additional works at: [https://rdw.rowan.edu/engineering\\_facpub](https://rdw.rowan.edu/engineering_facpub)



Part of the [Civil Engineering Commons](#), and the [Transportation Engineering Commons](#)

---

### Recommended Citation

Rivera, K., & Ali, A., & Mehta, Y., & Patel, S. D. (2021, July), Long Term Impact of New Jersey National Summer Transportation Institute Hosted at Rowan University on Career Choices of Cohorts (Evaluation) Paper presented at 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference. <https://peer.asee.org/37462>

This Conference Paper is brought to you for free and open access by the Henry M. Rowan College of Engineering at Rowan Digital Works. It has been accepted for inclusion in Henry M. Rowan College of Engineering Faculty Scholarship by an authorized administrator of Rowan Digital Works.

## **Long Term Impact of New Jersey National Summer Transportation Institute Hosted at Rowan University on Career Choices of Cohorts (Evaluation)**

**Ms. Kristine Rivera, Center for Research and Education in Advanced Transportation Engineering Systems**

Kristine Rivera is the Administrative Assistant for CREATES and supports the department with all issues of procurement, maintaining grants and executing our many workshops and tours. She has assisted with development of the Center's NSTI program since its initiation in 2017.

**Dr. Ayman Ali**

**Dr. Yusuf Mehta P.E., Rowan University**

Dr. Mehta is a Professor at the Department of Civil and Environmental Engineering at Rowan University and Director of the Center for Research and Education in Advanced Transportation engineering Systems (CREATES). Dr. Mehta has extensive experience in teaching construction materials, pavement design, and transportation engineering. Dr. Mehta has published several technical and educational papers in leading professional organizations.

**Miss Shivani D Patel, New Jersey Department of Transportation**

## **Long-Term Impact of New Jersey National Summer Transportation Institute Hosted at Rowan University on Career Choices of Cohorts (Evaluation)**

### **Abstract**

In the summer of 2017, 2018, and 2019, the Center for Research in Education in Advanced Transportation Engineering Systems (CREATES) at Rowan University hosted the National Summer Transportation Institute. The goal of this program is to provide high school students exposure to transportation engineering and other transportation-related education paths. More than 50% from underrepresented minority groups, including women, African Americans, and Hispanics/Latinos attended the two-week program. In 2017, the program was a non-residential, four-week program; 2018 was a two-week residential program and, in 2019, the program was a two-week non-residential program. In all programs, the students explored different modes of transportation, such air, road, rail, water, with an overarching theme of safety and sustainability. The experience was provided through a) hands-on experiments; b) field trips; and c) federal, state and industry speakers. This paper presents the findings of the students' career choices and what aspects of the NSTI program, if any, impacted them the most. This paper also provides a blueprint to other NSTI programs across the country as they design their own curriculum.

### **INTRODUCTION**

The US Department of Transportation, Federal Highway Administration (FHWA) in partnership with state highway agencies (State DOTs) offers an annual program known as the National Summer Transportation Institute (NSTI). This program is typically held in most states across the nation and aims to increase awareness of the potential career opportunities in the transportation industry among middle and/or high school students. The program focusses on minority, female, and underrepresented groups of middle and/or high school students and aims to fulfill the following objectives:

- Increase awareness, among minority; female; and underrepresented high school students (grades 9 through 12), of the wide range of transportation modes and potential career opportunities in transportation-related fields;
- Teach high school students Science, Technology, Engineering, and Math (STEM) skills through interactive and fun activities and ultimately improve their STEM skills; and,
- Strengthen the links between the transportation sector and public/private institutions through the creation of partnerships.

CREATES at Rowan University previously submitted a paper entitled "Evaluation of the 2017 National Summer Transportation Institute Hosted at Rowan University". This study compiled and evaluated the curriculum and assessed the degree to which the activities were successful and well-received by the participants based on surveys submitted for each activity. The evaluation results indicated that the participating students enjoyed the various sessions and activities, suggesting that the program was successful.

### **STUDY OBJECTIVES**

The objective of this study is to present the long-term impact of the NSTI program on the career choices of its cohorts. It is believed that the curriculum utilized by CREATES offers unique benefits to not only STEM students, but also to students who have not yet decided their major. The authors have done so by increasing their awareness of the diverse and varied career paths under the 'umbrella' of engineering.

**OVERVIEW OF NSTI ACADEMIC PROGRAM AT ROWAN UNIVERSITY**

The NSTI Summer Program at Rowan University involved an academic program that aims to fulfill the overall goal of acquainting high school students with the transportation industry and potential transportation careers. The specific objectives of the program are:

- Educate students by introducing them to the various transportation modes and the transportation industry;
- Motivate students and encourage them, through practical and academic experiences, to pursue careers in transportation-related fields;
- Expose participating students to STEM topics through a set of pre-designed educational activities;
- Introduce participating students to workings of various agencies serving multiple transportation modes through field trips and on-site seminars; and,
- Enhance students’ leadership and professional skills through activities designed to introduce them to university life and the main requirements needed to obtain a college degree.

The authors had presented a more detailed description of the curriculum (1) and the evaluation of the program in the first year. However, the following subsections provide a brief description of each of these sessions.

**OVERALL STUDENT DEMOGRAPHY AND RACE**

Table 1 shows the demographic, racial, and ethnic distribution of the student cohorts in each year.

Table 1. NSTI demographics and race distribution by year

<b>Year Reporting</b>	2017	2018	2019
<b>Dates of Institute</b>	July 24 – August 18, 2017	July 8 – July 20, 2018	July 8 – July 19, 2019
<b>Program Classification</b>			
Age of Students	High School	High School	High School
Type of Residency	Non-residential Program	Residential Program	Non-Residential Program
<b>Number of Applicants</b>	17	38	20
<b>Number Completing Program</b>	14	25	18
<b>Ethnicity</b>			
Caucasian	10	6	8
Latino/Hispanic	2	3	1
African American	1	8	0
Asian	1	5	8
Biracial	0	2	0
Not self-identified	0	1	1
<b>Gender</b>			
Male	11	16	15
Female	3	9	3
<b>Geographic Representation</b>			
Number of Cities in NJ	7	19	7

### **Registration, Orientation, and Welcome Session**

In this session, the students and their parents are welcomed into the NSTI program and introduced to its goals and objectives. Orientation also involves presentations made by NSTI Director and the state's Department of Transportation-Civil Rights Division representative discussing the history of the National Summer Transportation Institute program. In addition, orientation includes discussions revolving around the program's curriculum, expectations (e.g., drop off and pickup locations), as well as a review of the forms submitted by participating students.

### **Seasoned Speaker Sessions**

In these sessions, seasoned speakers from various fields of the transportation industry are invited to speak to the students about potential career paths they can pursue in the field of transportation engineering and other relevant engineering fields. An example of a session includes a presentation provided by a speaker from the Federal Aviation Administration (FAA) discussing the role of the FAA and potential career paths the students can pursue as part of the FAA, such as aerospace engineer, or air traffic controller. In addition, all these sessions aim to help the students gain an understanding of the different fields of engineering that can be studied in order to be part of the transportation workforce; that is, how other engineering fields are related to transportation, not only Civil Engineering.

### **Hands-On Laboratory Experiments**

The goal of the hands-on laboratory and experimental sessions is to provide students with a fun, interactive learning environment in which they can discover different aspects of transportation engineering. All the hands-on sessions are designed so that the students are engaged in the session through building or conducting an experiment. A session related to building and testing a bottle rocket is one example of such activities. In this session (Build a Bottle Rocket), the students are introduced to basic but fundamental aerodynamics concepts. Through this session, the students also learn the fundamentals of parametric experimental design by varying the wing size and configurations, bottle mass, and water propellant.

### **Field Trips and Site Visits**

The field trips include site visits and tours of transportation related centers and industry partners in the local region around Rowan University. These trips aim at helping the students learn about and get a taste of how the transportation world functions. An example of these trips is the visit to the FAA Technology Center. In this visit, the students learn about flight simulators and the requirements to learn how to fly an airplane. Other trips show the students how asphalt is made and placed to make roadways, how traffic is managed, congestion is minimized and controlled, as well as bridges and the degree of work required to maintain them.

### **STEM and Life Education Sessions**

In addition to the activities presented above, faculty and staff at Rowan University offered sessions on engineering, research and writing skills, budgeting skills, as well as computer skills (i.e., MS Word, Excel, and PowerPoint). All these sessions are given as a spin-out of transportation engineering problems to ensure maintaining the relevance of the program and its sessions to transportation engineering. An example of these sessions is the one offered to teach the students how to use Excel to solve transportation engineering problems, such as determining sight distance and finding the number of seconds needed to maintain a traffic signal in "Red" position between cycles.

## **Research Competition**

In the final week of the program, the students are required to participate in a transportation related research competition. This competition involves the students selecting the transportation theme they were most interested in learning about and then writing a paper and preparing a group presentation. Guidance is provided throughout the competition to help the students research and find relevant information and prepare the presentation. The students are then asked to present their findings during the Graduation, Awards, and Final Remarks session at the end of the program. Attendees of the concluding session rank the students and the student groups are presented with cash awards reflective of their ranking.

## **Graduation, Awards, and Final Remarks Session**

The NSTI program ends with a graduation ceremony and closing remarks meeting. In this meeting, Dr. Yusuf Mehta, CREATES' Director, concludes the program by providing the students and ceremony attendees with final remarks on the program's success and lessons learned. It is also an opportunity for students to discuss their experience with the program administrators and their parents.

## **LONG-TERM IMPACT ON CAREER CHOICES OF COHORTS**

### **Outreach Findings**

To evaluate the extent to which the goals of the program were achieved, parents of NSTI program graduates were contacted by telephone and email to request their participation in a brief survey about the students' experiences in their respective summer program. The questions posed were:

1. What is your current level of education?

Only students who already graduated high school were included in this study.

2. Did the NSTI program impact decision-making regarding your education or career goals?

The overwhelming response to this question was that parents and students were grateful for the opportunity to have access to industry partners, college-level instruction and access to facilities to which they might not otherwise have access.

3. If yes, please explain how and to what extent. If no, please explain why.

Comments included the following:

- Attending NSTI enabled the student to narrow his choice of engineering field
- Attending NSTI enabled the student to focus on her true interests
- Attending NSTI both challenged and confirmed some preconceived notions about engineering
- One student found the program to be "illuminating and helpful in guiding his choices"
- Program answered a lot of questions a student had before enrolling in a Civil Engineering program in college

An unexpected and frequent response was the level of interest NSTI graduates had in returning to future programs as a presenter. It will be the intent of Rowan University to include this option when developing future NSTI programming and curriculum. Table 2 shows where NSTI graduates have pursued their careers. Thirteen of those have been in different field of engineering, the other three have been in Sports Science, Business administration, and one is undeclared.

**TABLE 2: Career choice of 2017 – 2019 NSTI Graduates**

<b>Cohort Year</b>	<b>Gender</b>	<b>Race</b>	<b>Residential/Non-residential</b>	<b>School Selection</b>	<b>Intended Major</b>
2017	M	Caucasian	Non-Residential	Georgia Tech	Aerospace Engineering
2017	M	Caucasian	Non-Residential	Drexel University	Electrical Engineering
2017	F	Caucasian	Non-Residential	Rhode Island Institute of Technology	Biomedical Engineering
2017	M	Caucasian	Non-Residential	Naval Academy	Mechanical Engineering
2017	M	Caucasian	Non-Residential	Embry Riddle Aeronautic University	Aerospace Engineering
2018	M	Caucasian	Residential	Rowan College of Burlington County (intention to transfer to Rowan University in second year)	Mechanical Engineering
2018	M	Caucasian	Residential	Drexel University	Robotics Engineering
2018	F	Afro-American	Residential	Stevens Institute of Technology	Software Engineering
2018	F	Asian	Residential	Drexel University	Chemical Engineering
2018	M	Afro-American	Residential	Lancaster Bible College	Sports Science
2018	M	Afro-American	Residential	Rowan College of Gloucester County	Business Administration
2019	M	Caucasian	Non-Residential	Drexel University	Mechanical Engineering
2019	M	Asian	Non-Residential	Rowan University	Electrical Engineering
2019	F	Asian	Non-Residential	Drexel University	Undeclared
2019	M	Latino/Hispanic	Non-Residential	GA Institute of Technology	Material Science and Engineering
2019	M	Latino/Hispanic	Non-Residential	Drexel University	Chemical Engineering

## **SUMMARY OF FINDINGS**

In the total 3-year NSTI enrollment of 58 students, 36 students have since graduated from high school. Of the 36 students whose parents responded, at least 13 indicated that they are pursuing a degree in a field of engineering in college. Based on the comments from the fourteen students, they believed that NSTI had an impact on the career choice. Therefore, NSTI offered at Rowan University continues to have a long-term impact on the students.

## **ACKNOWLEDGEMENT**

The authors would like to acknowledge the USDOT, the Federal Highway Administration, and the New Jersey Department of Transportation/Division of Civil Rights for funding this study through the National Summer Transportation Institute.

## **References**

1. Ali, A. Mehta, Y., Patel, S., Evaluation of the 2017 National Summer Transportation Institute Hosted at Rowan University, Proceedings of the 2018 ASEE Annual Conference Proceedings, Salt Lake City, UT.