

1. Report No. SWUTC/10/169115-1		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle Partnering with AVID to Create Transportation Scholars				5. Report Date October 2010	
				6. Performing Organization Code	
7. Author(s) Melisa D. Finley and Debbie Jasek				8. Performing Organization Report No. Report 169115-1	
9. Performing Organization Name and Address Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. 10727	
12. Sponsoring Agency Name and Address Southwest Region University Transportation Center Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135				13. Type of Report and Period Covered Technical Report: September 2008–August 2010	
				14. Sponsoring Agency Code	
15. Supplementary Notes Supported by general revenues from the State of Texas					
16. Abstract <p>The goal of this project was to team with the Advancement Via Individual Determination (AVID) program in local schools to stimulate student awareness of transportation and engineering careers and to encourage interest in the science, technology, engineering, and mathematics (STEM) fields. AVID is an in-school academic support program for grades 4–12 that prepares underserved students (predominantly minority and economically disadvantaged) in the academic middle for college eligibility and success. The team developed and conducted four half-day workshops and a field trip for AVID students from four schools in Texas. Approximately 150 students participated in the half-day workshops and approximately 40 students attended the field trip. These events offered students an opportunity to gain hands-on experience and insight into transportation and engineering careers. The events also provided exposure and mentoring from role models that currently work in the transportation field.</p>					
17. Key Words Careers in Transportation, Careers in Engineering, STEM, Transportation Outreach Programs			18. Distribution Statement No restrictions. This document is available to the public through NTIS: National Technical Information Service, Springfield, Virginia 22161 http://www.ntis.gov		
19. Security Classif.(of this report) Unclassified		20. Security Classif.(of this page) Unclassified		21. No. of Pages 43	22. Price

**PARTNERING WITH AVID TO CREATE
TRANSPORTATION SCHOLARS**

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Report SWUTC/10/169115-1

Project Number 169115

Research Project Title: Partnering with AVID to Create Transportation Scholars

Sponsored by the Southwest Region University Transportation Center

October 2010

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EXECUTIVE SUMMARY

The current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place. One opportunity to stimulate student awareness in transportation careers and employment opportunities is creating partnerships with existing programs that target students with interests in attending college. One such program is Advancement Via Individual Determination (AVID). AVID is an in-school academic support program for grades 4–12 that prepares underserved students (predominantly minority and economically disadvantaged) in the academic middle for college eligibility and success.

The team developed and conducted four half-day workshops for approximately 150 AVID students at two middle schools in the Killeen Independent School District and a field trip to the Texas Transportation Institute (TTI) facilities at the Texas A&M University campus for approximately 40 AVID students from two intermediate schools in the College Station Independent School District. These events offered students an opportunity to gain hands-on experience and insight into transportation, engineering, and technology careers. It also provided exposure and mentoring from role models that currently work in the transportation field. Thereby, encouraging AVID students to attend college and choose a career in transportation or engineering.

Unfortunately, funding, travel, and time constraints limit the ability of school districts and transportation professionals to conduct these types of in-person events, as well as develop more in-depth events (e.g., further details regarding certain topics, group projects, etc.). Thus, research into additional education modules and new methods for conducting educational outreach programs would benefit academic programs. The use of webinar technology provides an opportunity to reach more students regardless of their location or proximity to a major university in a more cost and time efficient manner. Evaluation of webinar technology would provide insight regarding its feasibility and effectiveness in this type of environment.

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ACKNOWLEDGMENTS

The authors recognize that support for this research was provided by a grant from the U.S. Department of Transportation, University Transportation Centers Program to the Southwest Region University Transportation Center that is funded, in part, with general revenue funds from the State of Texas. The authors wish to acknowledge the contributions of LuAnn Theiss, Brooke Ullman, Srinivasa Sunkari, Jeff Miles, Beverly Storey, Gene Buth, and the many other Texas Transportation Institute staff that assisted in the conduct of the various outreach efforts. The authors would like to thank the following organizations for donating items to give to the students: the Texas Department of Transportation, Empco-Lite®, Teens in the Driver Seat, the National Work Zone Safety Information Clearinghouse, and the Texas A&M University College of Engineering.

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INTRODUCTION

The transportation industry, like every other profession that relies heavily on the science, technology, engineering, and mathematics (STEM) fields, faces a challenging future. According to a 2008 *USA Today* article (1), the high-profile goal of U.S. business groups to double the number of bachelor's degrees awarded in the STEM fields by 2015 was falling way behind target. While the number of degrees in these fields increased slightly earlier in the decade, the number of degrees had flattened out at around 225,000 a year. In short, the current and future success of the transportation infrastructure and its diverse array of components depend on developing a large cadre of individuals, both male and female, to design, plan, manage, operate, and maintain the vast infrastructure in place.

One opportunity to stimulate student awareness in transportation careers and employment opportunities is creating partnerships with existing programs that target students with interests in attending college. One such program is Advancement Via Individual Determination (AVID). AVID is an in-school academic support program for grades 4–12 that prepares underserved students (predominantly minority and economically disadvantaged) in the academic middle for college eligibility and success. Over the past decade in Texas, more than 300 schools, spanning 59 school districts, have implemented AVID, making Texas' statewide implementation of AVID the second largest in the nation.

The team developed and conducted four half-day workshops for AVID students at two middle schools in the Killeen Independent School District and a field trip to the Texas Transportation Institute (TTI) facilities at the Texas A&M University campus for AVID students from two intermediate schools in the College Station Independent School District. These events offered students an opportunity to gain hands-on experience and insight into transportation, engineering, and technology careers. It also provided exposure and mentoring from role models that currently work in the transportation field. The following chapters document the activities included and assessment of both types of events (half-day workshops and field trip).

HALF-DAY WORKSHOP OUTREACH EVENTS

A four-member team conducted four half-day workshops (two at each school) for 7th and 8th grade AVID students at Union Grove Middle School and Eastern Hills Middle School in Harker Heights, Texas, on May 12–13, 2009. The workshops lasted approximately 3 hours each and were held before and after lunch. Approximately 150 students attended the workshops. Table 1 contains a summary of the four half-day workshop events. Appendix A contains the workshop agendas for each school.

Table 1. Half-Day Workshop Events.

School	Date	Time	Grade	Number of Students
Union Grove Middle School	May 12, 2009	8:00 am to 10:40 am	8 th	26
		11:30 am to 2:40 pm	7 th	38
Eastern Hills Middle School	May 13, 2009	8:00 am to 11:05 am	8 th	50
		12:57 pm to 3:35 pm	7 th	35

ACTIVITIES

During each workshop, students attended a transportation and engineering career awareness session and the following break-out activities:

- Transportation in the news,
- Up close with the world of transportation gadgets,
- What’s my sign, and
- Zoom mobile.

For the break-out activities, team members divided students into four groups. The break-out activities were conducted simultaneously, with students rotating to a different activity every 30 minutes. The following sections describe the workshop activities.

Transportation and Engineering Career Awareness

Every workshop started with a TTI researcher making a 20–minute presentation to the entire group about the transportation industry and careers in engineering. The presentation was designed to promote interaction between the researcher and students. Specifically, the presentation included information about the following:

- What is transportation;
- Transportation modes (interactive);
- Transportation system (interactive);
- Texas transportation facts;
- Current transportation issues;
- Transportation careers;
- What is engineering;
- Why you would want to be an engineer;
- Engineering in transportation;
- Transportation engineering careers;
- Classes needed in high school; and
- Engineering college degrees, additional training, and professional licensure.

Figure 1 shows a TTI researcher presenting this material to AVID students. Appendix B contains the slides from the presentation.



Figure 1. Researcher Presenting Transportation and Engineering Career Information to AVID Students.

Transportation in the News

For this activity, team members placed students into small groups (two to four students per group). A TTI researcher then provided each group with newspapers and supplies (scissors, glue, highlighters, markers, and 14-inch by 17-inch drawing pads) to create “Transportation in the News” posters. Students were instructed to find as many articles as they could that involved any aspect of transportation, clip each article, and glue the clippings on the paper provided. Students were also encouraged to use highlighters to underline words and phrases in each clipping that were about transportation and to use markers to decorate their poster. At the end of this activity, the TTI researcher reviewed and discussed each groups’ findings. Figure 2 shows AVID students identifying transportation related articles in newspapers, and one group’s poster. Appendix C contains the instructions for Transportation in the News activity.



Figure 2. Transportation in the News Activity.

Up Close with the World of Transportation Gadgets

For this activity, a TTI researcher discussed how the human eye works, driver visual needs at night, and retroreflectivity (the ability of an object to redirect light back to its source). The students then used hand-held microscopes and flashlights to examine:

- Beads used in pavement markings,
- Retroreflective sign material,
- Retroreflective pavement markings,
- Retroreflective raised pavement markings (RPMs), and
- A retroreflective construction worker vest.

Students also looked at a traffic cone, warning light, and portable rumble strip. The TTI researcher also explained how traffic and pedestrian signals work. Figure 3 shows AVID students during the Up Close with the World of Transportation Gadgets activity.



Figure 3. Up Close with the World of Transportation Gadgets Activity.

What's My Sign

For this activity, team members placed students into small groups (two to four students per group). First, the students answered some fun questions regarding traffic signs (Appendix D). A TTI researcher then discussed the design of traffic signs, including background color, shape, and the use of symbols versus text. The TTI researcher then provided each group with supplies (markers and 14-inch by 17-inch drawing pads) to create a sign for one of the following situations considering the information previously discussed (i.e., sign color, shape, etc.):

- Your classmate trips and falls while walking; during the fall they spill their lunch.
- The school wants to create an area where iPods cannot be used.
- Your school mascot wants to cross the street.
- Your class is taking a trip to another planet and you need to understand that in this new world you can't walk to the left side of a tree.

At the end of this activity, the TTI researcher reviewed and discussed each group's sign. Appendix E contains an outline of this activity. Figure 4 shows AVID students creating their signs, and several groups' signs.



Figure 4. What's My Sign Activity.

Zoom Mobile

The zoom or puff mobile is an activity that the American Society of Civil Engineers created for Public Broadcasting System (PBS) Kids activities during National Engineers Week (Appendix E). The activity encourages students to be creative and to work as a team in designing a vehicle that can travel the farthest distance possible when a team member puffs or blows on it. A TTI researcher gave each team three straws, four lifesavers, one piece of paper, two paper clips, a roll of tape, and scissors. In order for the vehicle to work properly, the group must design a vehicle that functions well mechanically (i.e., the wheels move freely, and aerodynamically). At the end of this activity, the teams race their vehicles and discuss the advantages and disadvantages of the vehicles' designs. Figure 5 shows AVID students building and racing their zoom mobiles.

ASSESSMENT OF EVENT

The team evaluated the effectiveness of the workshops based on discussions with the AVID teachers, as well as informal feedback from the team. Both AVID teachers thought the workshops provided information to the students that would not be accessible without the expertise of the team members. In addition, they thought the workshop format kept the students engaged, and the enthusiasm of the team members really brought the world of transportation to life.