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MTI MINETA TRANSPORTATION INSTITUTE

Workforce Development Academy for Youth

Hassan Hashemian, PhD

CSUTC California State University Transportation Consortium

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MINETA TRANSPORTATION INSTITUTE

Founded in 1991, the Mineta Transportation Institute (MTI), an organized research and training unit in partnership with the Lucas College and Graduate School of Business at San José State University (SJSU), increases 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, we help create a connected world. MTI leads the California State University Transportation Consortium (CSUTC) funded by the State of California through Senate Bill 1 and the Climate Change and Extreme Events Training and Research (CCEETR) Program funded by the Federal Railroad Administration. MTI focuses on three primary responsibilities:

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Project 25-35

Workforce Development Academy for Youth

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16. Abstract

To address the need for a diverse workforce in the 21st century and create an awareness of the career paths and opportunities that exist in the transportation industry, the College of Engineering, Computer Science, and Technology at the California State University, Los Angeles (CSULA) has created the Workforce Development Academy for Youth (WDAY). The goal of this program is to build a pipeline of diverse, well-qualified young professionals for the transportation industry. The program works with high school students and teachers to offer academic courses, basic skills, workforce readiness training, internships, extracurricular activities, and career placements to prepare students and place them into the Science, Technology, Engineering, and Math (STEM) college track. The academy emphasizes transportation as a valuable, accessible industry and aims to increase the number of underrepresented minorities and women who directly enter the transportation workforce. It also aims to increase the number of young people who enter college to study engineering or technology and subsequently pursue careers in transportation- and infrastructure-related careers. The WDAY program included STEM instruction, leadership development activities, field trips, job skills building activities, hands-on engineering projects and research application, internships, and more to empower participants to build competencies critical to academic and professional success. The program was conducted as a full-year program with 25 student participants from 18 high schools. Student academic progress was carefully monitored throughout the duration of the program to assess the effectiveness of its various components, and further evaluation data was collected from both students and faculty in the form of surveys, written feedback, and observation notes. Overall, the evaluations were overwhelmingly positive. Many participants reported planning to continue their education in STEM disciplines or enter the transportation workforce directly, making WDAY an important steppingstone on their academic and professional journeys.

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Executive Summary

The need for transportation professionals is on the rise in many of the densely populated areas in the U.S. To meet the changing needs of the transportation industry's workforce and provide opportunities for students to enroll in this discipline, the College of Engineering, Computer Science, and Technology at the California State University, Los Angeles (CSULA) has created the Workforce Development Academy for Youth (WDAY). The goal of this program is to build a pipeline of diverse, well-qualified young people for the transportation industry. The program works with high school students and teachers to offer academic courses, basic skills, workforce readiness training, internships, extracurricular activities, and career placements to prepare students and place them into the Science, Technology, Engineering, and Math (STEM) college track. The academy places emphasis on transportation as an industry sector and aims to increase the number of underrepresented minorities and women who directly enter the transportation workforce. It also aims at increasing the number of young people who enter college to study engineering or technology and subsequently pursue careers in transportation- and infrastructure-related careers. The WDAY was conducted as a full-year program with 26 student participants from high schools.

1. Introduction

1.1 Background

The U.S. federal workforce is rapidly aging and moving toward retirement. In addition, Los Angeles is currently experiencing the largest growth of transportation-related construction in its history. The county is seeing a significant influx of new revenue from Senate Bill 1 (SB 1), a landmark transportation funding package that was signed by Governor Brown. This legislative package invests $54 billion to fix roads, freeways, and bridges in communities across California. However, recruiting and retaining an adequate workforce is a significant problem in both the public and private sectors. At the same time, women and minorities are underrepresented in the transportation field despite making up nearly half of the U.S. workforce, indicating that many are unlikely to be exposed to career opportunities in the transportation field from a young age. In response to this predicament, the California State University Transportation Consortium (CSUTC) selected CSULA to conduct the Workforce Development Academy for Youth (WDAY) program to develop a "workforce framework" to be used to educate the transportation workforce of the future. One important focus area is recruitment; outreach to grades K–12, college-level women, and minority students is considered vital to attracting the talent needed for the future of the transportation community. Targeting the youth of today provides an excellent opportunity to train the next generation of transportation employees. The WDAY program will assist in building the capacity of educational agencies to plan, implement, sustain, and evaluate transportation education activities to facilitate interest in the field of transportation and ultimately supply the skilled employees needed for the future transportation workforce.

1.2 Purpose

The purpose of the Workforce Development Academy for Youth program at CSULA is to build a pipeline of diverse, well-qualified young people for careers in the skilled trades and transportation industry. The program develops and implements a recruiting and marketing plan aimed at attracting 25 minorities, women, and disadvantaged students from high schools to the transportation industry through programs that would utilize the educational skills of CSULA in developing transportation-related skills for students. The program provides internships; access to role models, mentors, sponsorship; and involvement in professional organizations to foster networking.

1.3 Program Goals

Based on the needs assessment and purpose of the program, Cal State L.A. identified the following six goals to increase the number of high school-age people who enter college to study STEM and pursue careers in STEM and transportation- and engineering-related fields.

1. **Program Outreach:** Empowering the involvement of women and minorities in STEM fields through engagement during high school;

2. **Leadership Development Program (LDP):** Developing students' communication skills, leadership, and intrinsic motivation;

3. **Career-Relevant Skills:** Offering training in job-relevant skills, including workforce readiness, AutoCAD/SolidWorks robotics, Microsoft Office tools, and highway construction materials;

4. **Lecture Series on Careers in Transportation:** Lecturing on transportation engineering and infrastructure, offering exposure to concepts and ideas to help students find their career interests;

5. **Internships, Mentoring, and Career Placements:** Providing internships, role models, mentoring, coaching, and career placement with transportation agencies and other related companies and programs;

6. **Counseling and College Placements:** Providing counseling and placement support for college application or immediate career entry upon high school graduation.

2. Program Outreach

Program Objective

Leveraging established relationships between CSULA; University Auxiliary Services (UAS); the Mathematics, Engineering, and Science Achievement (MESA) program; the Minority Engineering Program (MEP); and local high schools, we developed and implemented a recruitment plan to attract high school students to the transportation field.

The WDAY staff and undergraduate assistants collaborated on the recruitment strategy, which involved identifying 20 target high schools, scheduling campus presentations and school visits, participating in conferences and community events, preparing application materials, and organizing interview and selection timelines. Specific outreach efforts included orientation and information sessions for students, parents/guardians, teachers, and counselors, as well as classroom presentations by transportation professionals and CSULA's women and minority students serving as role models.

Outreach included the mass mailing of brochures and application forms to teachers and counselors. As a result, we received 51 applications from students across 18 high schools. Twenty-six students were selected for admission, with an additional 25 placed on a waiting list. At least one qualified student was selected from each participating school based on the established criteria outlined in Table 1 below. Admissions decisions were made following applicant interviews and rankings.

Table 1. Criteria for Student Admissions

GPA	Students must have a minimum 2.0 GPA.
School Status	Students must be concurrently enrolled in a high school and must be on schedule to graduate in June 2025, 2026, 2027, or 2028.
Transportation	Students must be able to attend classes at CSULA using either public or personal transportation.
Commitment	Students must make a commitment to attend scheduled Saturday sessions during the school year.

Notification of Selection Outcomes and Program Onboarding

Following the completion of the selection process, WDAY staff issued notifications to all applicants regarding their admission status. Accepted students received a comprehensive onboarding packet, which included the following materials:

1. **Award Notification** – Confirmation of acceptance into the program
2. **Letter of Confirmation** – Formal acknowledgment of participation
3. **Program Guidelines** – Overview of WDAY rules and expectations
4. **Health Certification Form** – Required documentation of medical clearance
5. **Personal Items & Dress Code Policy** – Instructions on appropriate attire and personal belongings
6. **Media Consent Form** – Request for permission to photograph or record participants
7. Applicants who were not selected were also contacted and informed of the decision.

Measurable Achievement

Fifty-one applications from 18 high schools were received, and 26 were students selected for the program.

Table 2. WDAY Demographic Summary

Host Site	**California State University, Los Angeles**			**Year Reporting**	**2024**	
Dates of Institute	6/01/24	5/30/25				
Program Classification:	X	High School				
Number of Applications		51				
Number of Participants		26				
Number Completing Program		26				
Ethnic Group			Race			
14	Hispanic		2	Caucasian	10	Asian
12	Non-Hispanic		0	Black	0	Other
Gender						
15	Male		11	Female		
Geographic Representation						
Number of Cities	13					
Number of Counties	3					

3. Leadership Development Program (LDP)

Program Objective

The Leadership Development Program (LDP) is a three-part developmental initiative designed to assess and enhance students' skills in communication, teamwork, and community engagement. The program's objective is to foster growth in leadership, interpersonal effectiveness, and self-motivation.

Participants are required to attend one focus group session during the year and engage in quarterly activities targeting the three core competencies. Each activity is structured to introduce key concepts while offering hands-on experiences that promote skill development.

Program Structure and Activities:

1. **Orientation & Team Building**
    a. Introduction to the LDP framework;
    b. Icebreakers and ongoing team-building exercises to foster group cohesion.
2. **Communication Skills Development**
    a. Exploration of communication in leadership;
    b. Student presentations and exercises focused on verbal and non-verbal communication;
    c. Initial self-assessment of individual communication strengths and areas for growth.
3. **Teamwork in Practice**
    a. Group-based projects and collaborative tasks;
    b. Instruction on strategies for effective teamwork;
    c. Pre-assessment of team-building skills.
4. **Capstone & Evaluation**
    a. Final assessments of communication, teamwork, and community involvement;
    b. Preparation of presentations for the graduation ceremony;

c. Reflective activities summarizing key leadership competencies.

Measurable Achievement

100% of students who completed the program met the criteria for certification in leadership development.

4. Career-Relevant Skills

Program Objective

The primary goal was to deliver instruction in transportation, engineering, and infrastructure, while equipping students with job-relevant skills aligned with industry standards.

Academic Courses and Project-Based Learning

Academic instruction was offered during the summer, fall, and spring terms of the 2024–2025 academic year. Courses were led by CSULA faculty and graduate students, with a focus on project-based, hands-on learning. Activities included the design and construction of practical engineering models and systems.

Transportation Engineering and Industry Exposure

Students explored a variety of transportation modes, including land, air, water, pipeline, and space systems. The curriculum emphasized intermodal systems, environmental impacts, alternative fuel sources, and transportation safety and security.

Instruction was supplemented with educational videos that illustrated the role of transportation engineers, job pathways in the field, historical developments, and future trends. These materials highlighted the importance of transportation engineering in daily life and guided students through potential career trajectories.

Transportation Safety and Security

To deepen students' understanding of the safety and security aspects of transportation systems, instructional sessions included lectures and multimedia presentations on risk management, system vulnerabilities, and preventative strategies.

Math and Physics Instruction

To support academic performance and standardized test readiness, students received targeted reviews in physics. Students were introduced to foundational concepts in:

- Kinematics: Displacement, velocity, and acceleration
- Dynamics: Forces, Newton's laws, friction, drag, and elasticity

Students applied these principles through hands-on engineering challenges such as building popsicle stick bridges, launching pop-bottle rockets, and designing solar-powered vehicles.

Workforce Readiness and Skill Development

A comprehensive series of workforce readiness workshops prepared students for future internships and employment opportunities. Topics included:

- Professional behavior in the workplace
- Resume and cover letter development
- Job search strategies
- Interview preparation

Students also had opportunities to apply for internships with organizations such as Caltrans, MTA, LADOT, CTF, and the Board of Public Works.

Technical Skills Training included hands-on instruction in:

- AutoCAD and SolidWorks
- Robotics
- Highway construction materials
- Software programming
- Tool operation and usage
- Team-based technical projects

Skill-building activities were enhanced through:

- Group presentations
- Guest lectures from industry professionals
- Field trips

Customized enrichment opportunities as needed

Figure 1. Transportation Engineering Topics Sessions

Microsoft Office Training

As part of the program's workforce readiness component, students received targeted instruction in Microsoft Word, Excel, and PowerPoint to build essential digital literacy skills applicable in both academic and professional settings. These workshops were designed to equip students with the foundational knowledge and practical experience needed to confidently use industry-standard software in real-world contexts. Each session provided step-by-step guidance, allowing students to engage in hands-on learning while completing exercises that mirrored tasks commonly encountered in office, research, and project-based environments.

In Microsoft Word, students learned how to format professional documents such as memos, reports, and formal emails. They practiced using templates, adjusting fonts and layouts, inserting citations, and reviewing documents collaboratively with track changes and comments. The Excel training introduced students to spreadsheet fundamentals, including data entry, formula creation, cell formatting, chart generation, and data analysis tools—skills vital for managing information and conducting basic quantitative evaluations. In PowerPoint, students explored effective presentation design, incorporating visual elements such as images, graphs, transitions, and hyperlinks to communicate ideas clearly and persuasively. Together, these sessions ensured that

students not only gained technical proficiency but also understood how to apply these tools to enhance communication, productivity, and professionalism.

Engineering and Technology Lab Tours and Presentations

As part of their experiential learning, WDAY students participated in multiple guided tours of Civil, Mechanical, and Technology laboratories at CSULA. These tours provided students with direct exposure to ongoing research and student-led projects in various fields of engineering and technology.

During the visits, students had the opportunity to observe hands-on demonstrations, explore state-of-the-art lab facilities, and engage with undergraduate and graduate-level work in disciplines such as structural engineering, robotics, computer-aided design, materials testing, and mechanical systems.

In addition to the tours, CSULA faculty, staff, and students delivered a series of informational presentations designed to deepen participants' understanding of academic life and career pathways in STEM fields. These sessions covered topics such as:

- The structure of engineering and technology degree programs
- The importance of interdisciplinary collaboration in solving real-world problems
- Tips for transitioning from high school to college
- Student success stories and research experiences

Presenters also discussed campus resources, student organizations, and support systems available to undergraduates pursuing STEM majors. Through these tours and presentations, WDAY students gained a clearer sense of what it means to study at a university level, the expectations of college coursework, and the diverse opportunities within engineering and technology careers.

Hydrology and Water Resources Laboratory Tour

As part of their experiential learning in the WDAY program, students were given an in-depth tour of the Hydrology and Water Resources Engineering Laboratory at CSULA. The visit began with a presentation by Dr. Joseph Lucey, a faculty expert in water systems engineering. Dr. Lucey introduced the students to the core objectives of the lab, which focuses on studying water flow dynamics, sustainable water resource management, and the design of hydraulic structures. He discussed the importance of hydrology in civil engineering and emphasized the real-world applications of lab research, such as flood control, water conservation, and the design of infrastructure that interacts with natural water systems.

Following the lecture, the students observed a hands-on demonstration involving a wave tunnel simulator. Dr. Lucey and his team used the machine to show how weirs—barriers built across rivers or channels—affect the flow and distribution of water. The students observed how the placement and shape of weirs influence velocity, water level, and energy dissipation. This visual and interactive experience helped students connect theoretical principles with practical engineering solutions. Through the demonstration, they gained a clearer understanding of fluid behavior and how engineers use hydrologic modeling to solve problems in urban planning, environmental protection, and water infrastructure design.

Figure 2. Students at the Hydrology and Water Resources Laboratory

MESA and Cal State Los Angeles Present Boeing Day and Open House

Through a partnership between the Mathematics, Engineering, Science Achievement (MESA) program and CSULA, WDAY students were invited to attend the university's annual Boeing Day and Open House—a signature event designed to expose students to educational and career pathways in science, technology, engineering, and mathematics (STEM).

The event opened with an inspiring address by Dr. Emily L. Allen, Dean of the College of Engineering, Computer Science, and Technology, who encouraged the hundreds of student attendees to pursue their aspirations in STEM fields through perseverance and passion. Following the welcome, WDAY participants joined campus tours and attended a wide range of engaging workshops and interactive sessions.

Career Pathways in Transportation and Engineering

Several practicing electrical, mechanical, and civil engineers had a forum to answer students' questions on career opportunities in engineering, focusing especially on the transportation field.

Personal Statement Tips: Dr. Rebecca Joseph, CSULA

Tips on how the students can start building their college portfolio for college admission.

Design Expo: Building solar cars with a team, Chris Bachman, CSULA

Learning about team work and the design of car to run on a dirt terrain and compete against other cars.

Visiting and Demonstrating CSULA's Student Projects

Students visited technology labs and attended lectures on research, design, and construction of Solar Car, Mini Baja, and Electrical Car projects.

Hands-On Engineering Experience

Students also participated in the Design Expo, led by Chris Bachman of CSULA. Working in teams, they built solar-powered cars designed to navigate dirt terrain, competing in friendly races to test their cars' performance. This activity emphasized key engineering principles such as aerodynamics, energy efficiency, and mechanical design, while also reinforcing teamwork and problem-solving skills.

Lab Tours and Exposure to Campus Resources

To further spark interest in engineering and applied sciences, students were guided through a tour of CSULA's cutting-edge engineering labs, including the Eco-Car Laboratory. These tours allowed students to observe ongoing research and interact with college students working on real-world sustainability projects, giving them a deeper understanding of the innovation and collaboration involved in university-level engineering.

This immersive event played a vital role in helping WDAY students envision themselves as future engineers and scientists, while also providing them with practical tools and role models to guide their academic and career journeys.

Phase II: Hands-On Engineering Projects and Research Application

During the second phase of the WDAY program, students engaged in a series of hands-on engineering projects designed to deepen their understanding of the research and development process while fostering critical thinking, collaboration, and technical skills. These projects provided an opportunity for students to apply theoretical knowledge to real-world engineering challenges, reinforcing concepts through experiential learning.

The projects followed a structured approach that introduced students to the key stages of the engineering design cycle, including research and conceptual exploration, theoretical framework and design planning, fabrication, testing, and performance evaluation.

Throughout the project cycle, instructors actively engaged with students to explain the engineering design process, provide technical feedback, and encourage questions that deepened conceptual understanding. The hands-on nature of this phase not only made learning more dynamic and interactive but also helped students develop essential skills in research, teamwork, design thinking, and analytical reasoning—key competencies for future success in STEM fields.

Popsicle Sticks Bridge Project

As part of their introduction to civil and highway engineering concepts, WDAY students participated in a popsicle stick bridge project, which provided a hands-on learning experience emphasizing teamwork, engineering design, and structural analysis.

Students were organized into teams of four and tasked with researching, designing, constructing, and testing a model bridge built entirely from popsicle sticks. The project began with each team conducting research on key engineering principles related to bridge construction, such as load distribution, structural integrity, and material properties.

Based on their research findings, teams developed PowerPoint presentations summarizing their approach and insights, which they then presented to the entire group. These presentations fostered critical skills in public speaking, collaboration, and technical communication. Certificates were awarded to the winning teams in recognition of their outstanding research and presentation efforts.

Following the presentations, each team created multiple bridge design concepts, carefully selecting one design to construct into a physical model. Teams applied their theoretical knowledge to build sturdy and efficient structures using only popsicle sticks and adhesive.

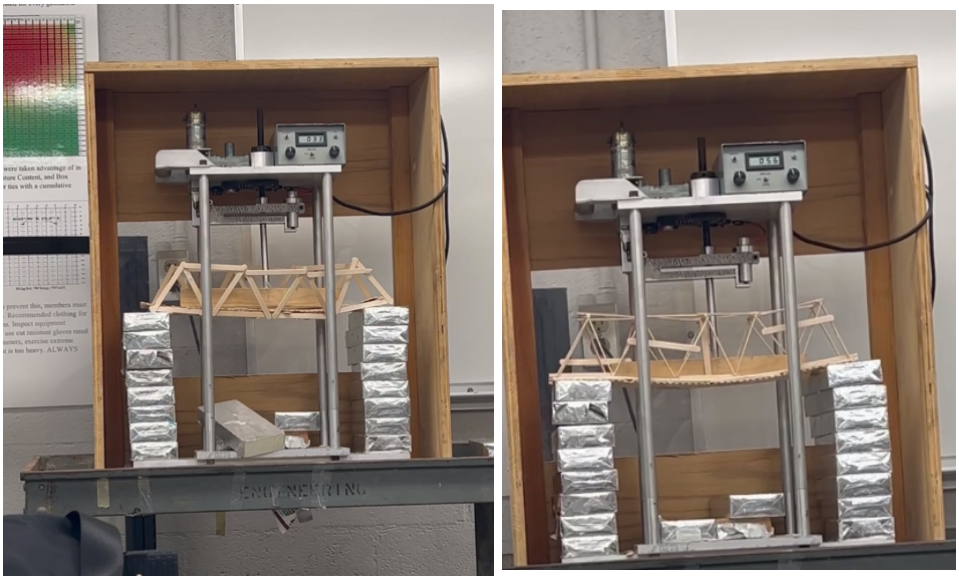
The culmination of the project was the popsicle stick bridge competition, where each bridge was tested for strength and durability under controlled conditions. Performance was measured by assessing how much weight each bridge could support before failure.

After the competition, teams analyzed their results, evaluating the effectiveness of their designs and identifying areas for potential improvement. This reflective process reinforced lessons in engineering evaluation, problem-solving, and iterative design.

Overall, the project successfully enhanced students' leadership, teamwork, research, and presentation abilities, while providing practical exposure to fundamental concepts in civil and highway engineering.

Figure 3. Students with their Popsicle Stick Bridges

Figure 4. Testing of the Popsicle Stick Bridges



Pop-Bottle Rocket Project

In this project, the class was divided into teams of four students, each responsible for researching, designing, constructing, and testing a hydro-pneumatic propelled pop-bottle rocket vehicle. The research phase required students to investigate fundamental physics concepts, the history of rocketry, and the basic principles that govern rocket propulsion. Teams compiled their findings into PowerPoint presentations, and the student with the most effective presentation received a certificate in recognition of their effort.

The design portion of the project involved applying relevant formulas related to rocketry principles and understanding rocket propulsion as a mode of transportation. Construction of the rockets utilized accessible, low-cost materials, encouraging creativity and practical engineering. The testing phase included both static tests, which evaluated the rocket's structural integrity on the launch platform, and dynamic tests, assessing flight performance. Students were also required to submit written and oral reports detailing the design process, construction challenges, and test results for their rockets.

The project concluded with a competition judged from two primary categories: design and performance. The design category assessed the use of advanced manufacturing techniques, innovative materials, and the creativity demonstrated in the rocket's appearance and build. The performance category evaluated flight results, including maximum altitude reached and flight stability during launch and ascent.

This comprehensive project fostered a deeper understanding of physics, engineering design, and teamwork, while providing students with practical experience in research, presentation, and performance analysis.

Figure 5. Students Present Preliminary Research on the Science of Rockets

Figure 6. Construction of Pop-Bottle Rocket

Figure 7. Testing of a Pop-Bottle Rocket Vehicle

Figure 8. Tours and Presentations at LA Union Station and Metro, MTA

Field Trips

Metropolitan Transportation Authority (MTA)

WDAY students participated in multiple tours and presentations at the Metropolitan Transportation Authority (MTA), which provided them with comprehensive exposure to both the administrative and engineering aspects of the agency's operations. These visits offered valuable insights into the transportation industry and introduced students to the day-to-day functioning of Los Angeles public transit systems.

Throughout the tours, students attended informational sessions led by MTA administrative staff and department heads, who shared their professional experiences and provided an in-depth understanding of engineering careers within the agency. The students also took part in "system ride-in" tours, where they traveled on various modes of public transportation, including buses and rail systems, gaining firsthand knowledge of transit operations.

The curriculum during these visits covered a range of topics, including:

- Bus Operation Division
- Information Technology Division
- Heavy and Light Rail Operations
- Operations and Divisions of Caltrans and the Los Angeles Department of Transportation (LADOT)

- Traction Power Division
- MTA Construction and Operational Sites

In addition to classroom and ride-along experiences, students engaged in practical fieldwork related to system design, transit-oriented development, and maintenance activities focused on system cleanliness. They also learned about MTA's safety protocols and the critical factors that contribute to secure and efficient transit operations.

These comprehensive tours and presentations enriched the students' understanding of public transportation infrastructure and prepared them for potential careers within large metropolitan transit agencies.

Tours and Presentations at LA Union Station and Metro, MTA

Figure 9. Tours and Presentation of Bus Operation Center at MTA

Figure 10. Tours and Presentation of Bus Operation Center at MTA

Figure 11. Air Transportation Presentation and Hands-On Project

Flabob Airport Visit

WDAY students participated in tours and presentations at the historic Flabob Airport, which offered them valuable exposure to career opportunities within the aerospace, aviation, and broader transportation industries. The visit combined educational activities with interactive experiences, including the use of flight simulators and tours of aviation facilities and the on-site aircraft museum.

This field trip provided students with an engaging introduction to various aspects of aviation, such as flight planning, the history of aviation, the physics underlying flight, and the design and maintenance of aircrafts. Through these experiences, students gained a deeper appreciation for the complexity and innovation involved in the aerospace field.

Additionally, the students received detailed information about the requirements for pursuing careers as certified pilots and air traffic controllers. They learned about the critical decision-making processes and qualifications necessary to succeed in these professions, emphasizing the importance of preparation and commitment for entry into the aviation industry.

Overall, the visit to Flabob Airport served as an inspiring and informative opportunity to explore the multifaceted nature of aviation careers and their role within the transportation sector.

Figure 12. Air Transportation Presentation and Hands-On Project

Figure 13. Air Transportation Presentation and Hands-On Project

Figure 14. Tours and Presentations at Aircraft Museum

Figure 15. Tours and Presentations at Aircraft Museum

Figure 16. Tours and Presentations at Aircraft Museum

Figure 17. Tours and Presentations at Aircraft Museum

5. Internships and Career Placements

Program Objective

The primary objective was to provide students with internship experiences and career placement opportunities within transportation agencies.

Internship Opportunities

Students were introduced to a variety of internship and job placement options focused on transportation services through partnerships with agencies such as the Los Angeles Department of Transportation (LADOT) and the Metropolitan Transportation Authority (MTA). Due to space limitations and safety protocols at LADOT and MTA facilities, WDAY students primarily participated in project-based internships conducted on the CSULA campus. These internships were supervised by faculty members from CSULA as well as representatives from LADOT and MTA.

Under this arrangement, students engaged in several hands-on projects, including the design of earthwork plans, interpretation of contour lines, calculation of earthwork volumes, and the creation of topographic maps using AutoCAD software. Additionally, they conducted testing of highway construction materials. These projects required students to apply creativity, collaboration, and innovative problem-solving skills, demonstrating a high level of critical thinking and technical competence. The pride students expressed upon successful completion of these complex assignments highlighted their dedication and effort.

Measurable Outcomes

A total of 26 students successfully completed the internship component of the WDAY program. Each participant was awarded a stipend in recognition of their contributions and commitment.

Technical Training: Road Design with *Civil 3D*

As part of their exposure to real-world engineering tools, WDAY students received hands-on training with *Civil 3D*, a professional civil engineering software developed by Autodesk. This software is widely used in industry for planning, designing, and managing civil infrastructure projects, particularly roadways and land development. The session introduced students to the basic functions of *Civil 3D*, such as importing topographic data, designing road alignments, generating profiles, and modeling corridors. Facilitators guided students through a practical exercise in which they used elevation data to design a roadway that adapts to natural land contours. This experience helped students understand how digital tools assist engineers in visualizing and refining complex infrastructure systems before construction even begins.

The training focused on designing roads in mountainous regions, such as those found throughout California. In such environments, road safety and accessibility are paramount, particularly for emergency and service vehicles. Students learned how to evaluate slope gradients, determine appropriate turning radii, and adjust elevations to comply with California Department of Transportation (Caltrans) and federal roadway standards. They also discussed the consequences of improper roadway design, such as increased accident risk, road closures due to inaccessibility, and environmental degradation caused by erosion or poor drainage. By simulating real terrain conditions in *Civil 3D*, students gained a deeper appreciation for how civil engineers must balance design precision, safety requirements, and environmental impact.

In addition to technical skills, the workshop highlighted the interdisciplinary nature of civil engineering projects. Students saw how roadway design integrates data from surveying, hydrology, environmental science, and traffic engineering. By the end of the session, they were not only more familiar with a leading industry software tool but also better equipped to understand the complexity and responsibility involved in infrastructure development. This training experience encouraged critical thinking and problem-solving, preparing students for future internships and academic pursuits in transportation and civil engineering.

Figure 18. Students Receive a Presentation on the Importance of Civil Engineering Principles for Roadway Design

Figure 19. Roadway Design Using *Civil 3D*

Mixing and Testing Structural and Highway Construction Materials

WDAY participants spent a day in the Civil Engineering Materials Laboratory at CSULA, gaining first-hand insight into structural materials testing used throughout the construction industry. The visit began with an overview of laboratory safety and an introduction to the purpose of materials testing in civil engineering. Faculty researchers, together with undergraduate and graduate assistants, demonstrated ongoing experiments that measure properties such as compressive strength, durability, and curing rates of concrete mixes.

While observing tests in progress, students discussed the composition of concrete, including the roles of cement, aggregate, water, and admixtures. Laboratory staff explained how different formulations are evaluated to achieve an optimal balance of early-age strength, long-term performance, cost efficiency, and environmental impact—factors that are critical for underground transit structures, highway systems, and building foundations.

A highlight of the tour was a hands-on activity in which each small group mixed its own concrete batch using specified proportions. After learning proper mixing techniques, students filled cube molds, compacted the mixture to eliminate air pockets, and labeled their specimens for later testing. Demonstrations of compression machines and non-destructive testing equipment showed how engineers determine whether a mix meets design specifications and safety codes.

Throughout the visit, the CSULA research team emphasized the real-world implications of their work, from extending the service life of transportation infrastructure to reducing the carbon

footprint of construction materials. By the end of the session, students had a clearer understanding of:

- The scientific principles behind concrete production
- Standard methods for evaluating material properties
- The iterative process of adjusting mix designs to meet project requirements
- The importance of collaboration between engineers, technicians, and researchers

This laboratory experience reinforced classroom lessons in material science and introduced participants to potential career paths in civil engineering, construction management, and infrastructure research.

Figure 20. Performing Concrete Sample Tests in the CSULA Lab

During this visit, the student group also learned about the student competitions and teams at CSULA, such as the Concrete Canoe team, and how these CSULA students are preparing for the regional competitions. Interacting with undergraduate and graduate students was a great experience for the group to learn about their future higher education path and it inspired their interest in the field of transportation engineering.

Robotics

WDAY students received an introductory lecture on the fundamentals of robotics, where they explored what defines a robot and how robotics technology is used to improve and support human life across various industries. The lecture covered key components of robots, including sensors, actuators, and control systems, as well as real-world applications such as automation in manufacturing, robotic surgery in healthcare, and autonomous vehicles in transportation. Students learned how robots are designed to sense, think, and act, and discussed how robotics is transforming the way we live and work.

Following the lecture, students were introduced to Arduino—a popular open-source electronics platform—and the Arduino Integrated Development Environment (IDE), which they used to program microcontrollers. Working in small groups, the students collaborated to construct their own functional robots using Arduino-based kits. Once assembled, the robots were programmed through the Arduino IDE and configured for wireless control via Bluetooth using a publicly available mobile app. This hands-on experience allowed students to apply engineering and programming concepts in a fun and engaging way, deepening their understanding of robotics and enhancing their teamwork and problem-solving skills.Figure 21. Robotics Workshop 41

Figure 21. Robotics Workshop

Job-Relevant Skills

Program Objective:

The goal of this component of the WDAY program was to provide students with hands-on training in job-relevant technical skills, specifically in the use of AutoCAD and SolidWorks—two essential software tools widely used in the engineering and design industries. By learning these programs, students gained practical experience that aligns with current industry standards and expectations. The training aimed to give participants a strong foundation in digital drafting, 3D modeling, and design visualization, preparing them to succeed in both academic and professional environments.

Workforce Readiness and Software Training

One of the key components of the WDAY program was to equip students with job-relevant technical and professional skills to prepare them for careers in engineering and related fields. A structured workforce readiness workshop was conducted with a focus on professionalism, resume and cover letter development, interview preparation, and job search strategies. These workshops helped students understand what employers are looking for and gave them tools to effectively present themselves. Many students who had never created a resume before received step-by-step guidance in crafting one tailored to internships and entry-level positions. Instructors emphasized the importance of showcasing leadership experience, academic achievements, and relevant extracurricular activities while avoiding common pitfalls. Students were encouraged to apply to internship opportunities with local agencies such as MTA and AECOM, gaining practical experience in real-world environments.

In addition to career development workshops, students received hands-on technical training in industry-standard software tools: AutoCAD, SolidWorks, and MATLAB. These software packages are essential in many engineering disciplines and are used by professionals to create detailed models and design plans. The AutoCAD training introduced students to the fundamentals of computer-aided design, including basic commands for drawing, editing, and dimensioning. They learned to create 2D plans, apply hatching, and manipulate geometric shapes, gradually working up to more complex tasks such as integrating profile views and modeling bridge components. The training also introduced students to 3D concepts, including how to represent 3D objects on a 2D plane—an important skill in engineering design and drafting.

The SolidWorks portion built on these foundations by focusing on 3D modeling and mechanical design. Students learned how to create and assemble parts, simulate motion, and test the integrity of their designs using built-in analysis tools. These software sessions emphasized teamwork and communication with students working in groups to complete design challenges and deliver presentations on their projects. By the end of the training, students had not only gained a solid foundation in two of the most widely used engineering software platforms but had also strengthened their problem-solving abilities and collaborative skills. This dual focus on technical proficiency and professional readiness was a vital step in preparing students to enter the competitive workforce.

Figure 22. Design Project in AutoCAD

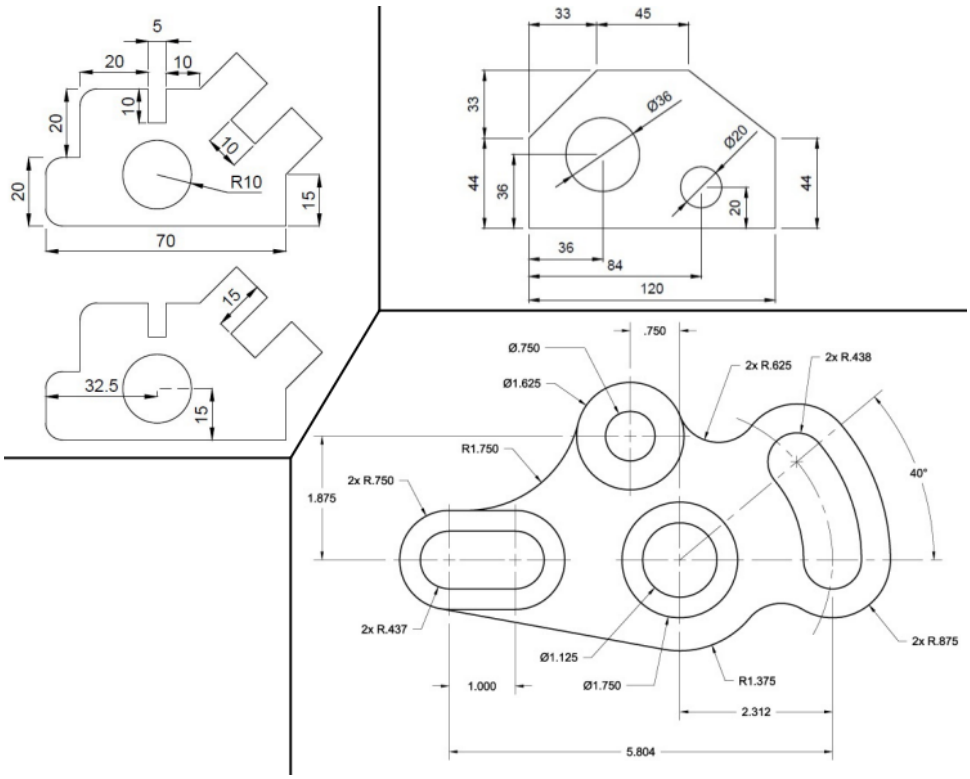


Figure 23. AutoCAD Session

SolidWorks

The students were introduced to the many applications of SolidWorks across various engineering disciplines, particularly in mechanical and product design. SolidWorks is a powerful 3D mechanical CAD (computer-aided design) program that enables users to create detailed parts, assemblies, and simulations. The training began with foundational instruction in basic commands, interface navigation, and editing tools that students would later apply in hands-on design projects. Through guided exercises, they learned how to sketch components, apply geometric constraints, and extrude shapes into three-dimensional forms.

As the session progressed, students advanced to more complex features such as creating assemblies by combining multiple parts, applying materials to visualize real-world prototypes, and generating technical drawings for manufacturing purposes. Just like in their AutoCAD training, students were taught how to produce accurate 3D renderings from 2D sketches, reinforcing their understanding of spatial reasoning and design accuracy. By the end of the SolidWorks module, the students had developed the ability to visualize and communicate engineering ideas in a professional and practical format, giving them a significant edge in future academic and industry settings.

Figure 24. SolidWorks Session

MATLAB

As part of their technical training, students were introduced to MATLAB, a high-level programming environment widely used in engineering and scientific research. The instruction covered the software's interface and basic functionalities, including how to input, process, and analyze data. Students learned how to create and modify figures to visualize datasets, enhancing their ability to interpret and present numerical information effectively. The hands-on exercises allowed students to apply basic commands and scripts, giving them a foundational understanding

of how MATLAB can be used to model systems, perform calculations, and generate visual outputs—skills that are highly valuable in both academic and industry settings.

Figure 25. MATLAB Session

Measurable Achievement

All program participants demonstrated mastery of both AutoCAD and SolidWorks software packages.

Orientation

An IATP orientation was held at CSULA On Tuesday, July 23, 2024, between 9:00 a.m.–12:00 p.m. with a total of 26 students and relatives. Dr. Hashemian welcomed WDAY students and their parents to the program and introduced the program facilitators. He presented the purpose of WDAY and an overview of the curriculum and schedule. He also explained WDAY objectives and the students' responsibilities and expectations within the program. The parents were informed of the campus location and time for signing in and out, supervision, insurance, and provisions in case of illness and injuries. At the end of the session, the facilitators gave students a tour of campus and showed the locations of student drop-off in the morning and pick-up in the afternoon.

Figure 26. WDAY Orientation Session

Figure 27. Campus Tour at Orientation Day

6. Program Evaluation and Student Academic Progress

Student academic progress was carefully monitored throughout the duration of the program to assess the effectiveness of its various components. The evaluation process included the measurement of students' academic performance, their ability to function and contribute to interdisciplinary team settings, and their development of communication and leadership skills. These assessments aimed to ensure that students gain not only technical knowledge but also the professional competencies required for future success in transportation-related careers.

In addition to academic oversight, students were given the opportunity to evaluate the instructional content, faculty performance, and overall learning experience. The project director and faculty members conducted regular weekly reviews of course materials, student projects, and lab activities to maintain high instructional standards and identify areas for improvement. Evaluation data, collected from both students and faculty, included surveys, written feedback, and observation notes. This data was then analyzed to determine the effectiveness of the program's structure and implementation. Overall, the evaluations of academic modules, field trips, and hands-on experiences were overwhelmingly positive. Student comments and letters highlighted the value of the program, and the Summary of Program Evaluation Forms (Table 3) affirmed that the program met or exceeded expectations across nearly all measures.

Table 3. Summary of Program Evaluation Survey

Overall Program Evaluation	**Ave. Score (out of 4)**	**Score (%)**
INSTRUCTORS The WDAY instructors were well organized.	3.52	88.00%
I was academically challenged by the activities the instructors provided.	3.68	92.00%
The instructors responded well to the questions posed to them.	3.78	94.50%
STAFF The staff was very interested in my career. awareness.	3.47	86.80%
The staff was very helpful when I had problems.	3.82	95.50%
The staff encouraged students to strive for excellence in all their pursuits.	3.75	93.80%
The staff was always available when I had a question or needed assistance.	3.88	97.00%
The staff was very friendly at all times.	3.76	94.50%
The staff was very knowledgeable on transportation-related careers.	3.75	94.00%
The staff was very enthusiastic about transportation-related careers.	3.68	92.00%
ACTIVITIES Project activities helped me understand transportation careers better than before.	3.61	90.30%
Generally, adequate time was allotted for project activities.	3.55	88.80%
Generally, adequate time was allotted for audience participation.	3.58	89.50%
Project activities gave me some practical experience related to transportation.	3.62	90.50%
Generally, adequate time was allotted for audience participation.	3.71	92.80%
Project activities often included competition between groups.	3.96	99.00%
OTHER The internship was appropriate.	3.85	96.30%
The number of field trips in the internship was appropriate.	3.58	89.50%
The number of projects was appropriate.	3.78	94.50%
Enhancement activities were beneficial.	3.68	92.00%
The number of days in the internship was appropriate.	3.59	89.80%
The WDAY was effective in my future career planning.	3.83	95.80%

7. Final Summary

The WDAY workshops ignited students' creativity and opened their eyes to the wide range of opportunities within the transportation industry. Through hands-on experiences, engaging presentations, and the integration of real-world projects, students were able to envision themselves as future engineers and innovators. The partnership with transportation agencies such as MTA and LADOT played a vital role in providing industry insight, mentorship, and career guidance. As a result, students left the program equipped with skills and knowledge that will support their educational pursuits and strengthen their preparation for future careers in transportation and engineering.

The Workforce Development Academy for Youth (WDAY) program succeeded in introducing students to key areas within STEM and the transportation sector, including engineering fundamentals, transportation systems, project design, and software applications such as AutoCAD and SolidWorks. These workshops also reinforced critical soft skills such as leadership, teamwork, and communication. The program's structure allowed students to gain a strong foundation in both technical and professional competencies, fostering their development as future STEM professionals.

Equally impactful was the internship component, which provided students with hands-on experience and the chance to apply their classroom learning to real-world engineering challenges. These internships helped students build confidence, demonstrate their problem-solving abilities, and gain insight into the day-to-day responsibilities of engineering professionals. As a federally designated minority-serving institution located in a historically underserved community, CSULA played a key role in recruiting and supporting students from low-income and underrepresented backgrounds. Many of these students plan to continue their education in STEM disciplines or enter the transportation workforce directly, making WDAY an important steppingstone on their academic and professional journeys.

About the Author

Hassan Hashemian

Dr. Hashemian has been a professor of Civil Engineering at California State University, Los Angeles for forty-five years. He has been teaching undergraduate and graduate courses in transportation and traffic engineering, transportation planning, traffic flow analysis, engineering economics, and probability and statistics. In addition, Dr. Hashemian has extensive experience managing federal and state-funded research and training programs. In the past thirty years, he has managed over 36 training programs and 35 research and consulting projects. He has also demonstrated success in many outreach projects, including the Infrastructure Academy Transportation Program, the Highway Construction Training, the Summer Transportation Institute, the Garrett Morgan Education Program, and the Dwight D. Eisenhower Fellowship Program. Dr. Hashemian is a highly respected educator. On January 11, 2018, at the Transportation Research Board meeting in Washington, D.C., he received the FHWA Public Service Award for his outstanding dedication, leadership, and contributions to advancing transportation education, research, and workforce development. He has won a number of other awards for research and teaching, including the Exemplary Achievement Award from Secretary of Transportation Mr. Rodney Slater in 1988, ITE in 1995, FHWA in 2001 and 2002, and the Outstanding Professor Award at CSU LA in 2006, 2007, and 2012. Dr. Hashemian has presented several technical papers at international and national conferences focusing on transportation engineering. For the present project, Dr. Hashemian was responsible for the academic leadership of the program, including the selection of instructors, academic assessments, and teaching. He was also responsible for implementing the statement of work according to the funding requirements of the MTI. Dr. Hashemian received his BS and MS from the University of Wisconsin–Madison, and his PhD from the University of California, Berkeley.

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