Experiential Learning Programs for Pavement Engineering Students

In addition to academic and technical preparedness, on-the-job training and other work-based learning experiences are critical components of worker readiness programs. These national programs provide co-curricular value to student career preparedness:

PAVEMENT ENGINEERING RESOURCES

American Concrete Institute (ACI)

The ACI Foundation Fellowship is an opportunity for students enrolled in college or trades programs to receive financial support. Students are expected to complete a 10- to 12-week internship prior to the award year.

American Concrete Pavement Association (ACPA)

Students may join ACPA to access industry research on pavement as well as networking opportunities with the concrete paving community: contractors, consultants, suppliers, academia, and transportation officials. Some states may have chapters with additional student support or activities. ACPA in partnership with the Innovative Pavement Research Foundation provides internship opportunities through its Interns of the Future program.

American Society of Civil Engineers (ASCE) Student Chapters

ASCE provides value to civil engineering and civil engineering technology students by expanding their network. Through volunteer opportunities, leadership resources, mentoring, student chapter meetings, scholarships, contests, and competitions, members meet colleagues who share a commitment to the civil engineering profession. Competitions of interest to Pavement Engineers include the *National Concrete Canoe Competition* and *International Contest on Long-Term Pavement Performance Data Analysis*. Students attend regional conferences to compete and to present technical papers.

International Society for Concrete Pavements (ISCP)

Students may join this organization for free and gain access to literature and a network of concrete professionals.

INTERNSHIP/CO-OP/EXTERNSHIP OPPORTUNITIES

Association of General Contractors (AGC)

Student chapters of the Association of General Contractors exist at accredited two- and four-year schools offering programs in construction management, construction technology, and construction-related engineering. Membership in an AGC student chapter provides young professionals with an opportunity to observe and develop their skills alongside industry leaders. AGC sponsors contests for student chapters that apply construction knowledge to real-world problems. AGC's Foundation provides scholarships for undergraduates, graduate students, and students pursuing a technical degree or apprenticeship. Opportunities such as job shadowing and career fairs are available through state AGC chapters.

Municipal Public Works Departments

Counties and cities offer opportunities for paid internships, co-ops, and externships. In externship situations, students spend one to three weeks with their hosts at their workplaces for a career exploration experience that usually includes networking, job shadowing, and a focus project. These experiences occur during semester breaks. It is important to emphasize that students can design their own externship experience.

State Departments of Transportation

DOTs offer internships for both community college, university and graduate students. Internships or co-ops are available in a number of occupations relating to asset management: civil engineering, construction, and maintenance. Some DOTs also employ college students to assist in the completion of seasonal work related to highway maintenance, crash system input and analysis, maintenance at roadside rest facilities, and flagging. Some training is provided on the job. DOTs offer rotational programs to entry-level engineers so that they experience different business areas within the organization before selecting a permanent assignment.

US DOT Federal Highway Administration (FHWA)

FHWA offers internships and financial support through its Dwight David Eisenhower Transportation Fellowship Program to students pursuing transportation-related occupations. Two hundred students are placed annually in interest-related assignments throughout the agency.

CO-CURRICULAR OPPORTUNITIES

American Association State Trans. Hwy Officials (AASHTO)

While students are not eligible for AASHTO membership, the website offers an email subscription to the *Daily Transportation Update* of transportation news from across the country. Transportation TV provides information on new publications, initiatives, and other news. This section also incorporates Transportation 101 segments—brief videocasts of topics. Other videos feature CEOs and other leaders in the transportation world. AASHTO provides a strong social media presence communicating issues, projects, and announcements.

American Public Works Association (APWA)

APWA student members connect with a network of professionals. Membership is available to anyone enrolled in at least nine credit hours per semester at an accredited college, university, junior college or community college offering associate's, bachelor's or advanced degree programs in engineering, public administration, planning, construction, or other public works-related coursework. State chapters provide scholarships as a way to attract students to this field.

Engineers Without Borders USA

Engineers Without Borders provides service-learning opportunities for students at the local and international levels. The national organization offers internships while student chapters offer opportunities for developing leadership, working on infrastructure projects, and making connections with professionals who provide mentorship. Many projects are public works projects. Opportunities exist for students, recent graduates, and professionals.

Institute of Transportation Engineers (ITE)

The ITE Student Leadership Summit is entirely planned by students, for students. Through the promotion of leadership and professional development, these events aim to guide future transportation professionals. The Traffic Bowl, another competition, tests students in topics such as transportation planning and engineering. State and local chapters provide opportunities for students to meet professionals and to learn about the latest in engineering practices in their communities.

National Society of Black Engineers (NSBE)

NSBE offers resources to students across the entire educational spectrum including retention, scholarships, leadership, and soft skills training through local networks and regional conferences. NSBE provides community STEM training for individuals who may want to mentor younger students.

National Society of Professional Engineers (NSPE)

Students can be members of NSPE and attend student chapters or local chapters to learn more about licensing and to network with professionals. The website offers a job board that can be filtered by internship opportunities. Students can log in to experience the virtual Professional Engineers Day event to learn more about the Professional Engineering (PE) license and to hear about the work PEs do from practitioners in the field.

Society of Hispanic Professional Engineers (SHPE)

SHPE programs offer support and development to increase degree persistence and attainment as well as aid undergraduates in professional development for a transition into either a STEM career or pursuit of a graduate degree.

Society of Women Engineers (SWE)

Open to all genders, SWE chapters exist in many institutions of higher education. Chapter activities range from mentoring, K-12 outreach, career and industry presentations, and opportunities for technical competitions, scholarships and national conference attendance.

State Local Technical Assistance Programs (LTAP)

These FHWA-funded centers offer training and coordination for Local Roads Programs or Road Scholar Programs. Opportunities for students vary by state. For example, the New York LTAP offers the *Cornell Asset Management Program (CAMP*). This program offers hands-on experience in implementing a pavement management system. Summer interns input data into a GIS mapping program, inventory drainage facilities and sidewalks, flag traffic, work as laborers on a highway crew, and operate equipment on construction sites.

The Association for Unmanned Vehicle Systems International (AUVSI)

Students involved in an AUVSI Student Chapter, gain experience in the industry and receive guidance from professionals in the chapter. Drones are emerging as a safer method for bridge inspection.

Transportation Development Foundation of the American Road Transportation and Transportation Builders Association

The Student Transportation Construction Industry Video Contest experience helps students gain a better understanding of the importance of transportation infrastructure investment to the U.S. economy and quality of life and to learn more about the industry and potential career opportunities. The contest is open to post-secondary, college, and graduate students. ARTBA also offers a number of scholarships for post-secondary students and women at the undergraduate or graduate level.

Innovative Learning Strategies for a Bridge Engineer Program of Study

To establish curricular lessons and activities that incorporate the latest strategies for increasing student learning effectiveness and retention, a review of practices deployed by workforce and CTE practitioners reveals several approaches that would benefit students within an engineering program of study. These learning strategies include:

Competency-Based Curriculum

Curriculum that meets academic and quality standards, is designed and organized by competencies required for jobs, and is cross-walked with industry skill standards and certifications, where applicable. Job profiling and the use of subject matter experts (SMEs) should be considered to meet the competency needs of business.

Modularized Curriculum

Structured and sequenced curriculum in modules tied to jobs with multiple entry and exit points and multiple levels of industry-recognized credentials built into the pathway.

Asynchronous Learning

Education/training for students and incumbent workers provided at times and locations convenient to students and employers. This may include evenings or weekends, blended or "hybrid" delivery models, and delivery at off-campus locations.

Problem-Based Learning

Instruction that helps students benefit from hands-on learning foster team-building skills while solving real-life problems.

Experiential Learning

Opportunities for "learning-by-doing." Examples include apprenticeships, internships, externships, rotational programs, co-op work experiences, simulations, and class projects that are assignments from local employers. Tinkering is the first step in the experiential learning continuum. Students pursue self-led, hands-on practice as a precursor to being involved in more significant activities. Tinkering projects are a great way to build a foundation for future engineering endeavors. Universities are offering Tinkering or Makerspace Design Studios equipped with tools and software to reverse engineer or build new products.

Context-Based Learning

Instruction that fosters interpretation of new information in the context or place of where and when it occurs. By relating new information to what the student already knows, the student comes to understand its relevance and meaning.

Individual Learning

Learners are different and innovative learning environments reflect the various experiences and prior knowledge that each student brings to class. It's important that practices and processes help teachers engage each student where they are.

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