



Photo: PCI

Many Ways to Learn

William N. Nickas, *Editor-in-Chief*

I have a colleague who says, “In times of uncertainty, there’s opportunity.” Well, I seem to think that’s exactly where we find ourselves right now—with opportunity!

It was hard not to notice the lack of attendees at this year’s Transportation Research Board (TRB) annual meeting in Washington, D.C. The low turnout was understandable, given the COVID-19 pandemic and the virus’s ability to morph. Still, those of us at the meeting had focused discussions in several sessions that highlighted the need to develop a strategy and programs to advance the engineering skills and abilities of the existing and upcoming engineering workforce. We continue to look for ways to surmount the age-old challenge of remaining up to date with the current and evolving (future) engineering environment. Time constraints continue to challenge most everyone I chatted with, but most concur that this is a topic we need to advance. As you may recall, Gregg Freeby and I discussed the National Concrete Bridge Council’s areas of emphasis, which includes knowledge dissemination, in our Winter 2022 *ASPIRE*® editorial.

With the challenge of shaping our industry’s future fresh in my mind, I returned to my PCI office to renew

my focus on updating PCI’s *Bridge Design Manual* (BDM). The BDM is a living document, and, as such, it needs a bit of TLC from time to time. Our bridge community has changed in the last few years, and we now have a broader array of strategies to address in areas such as design and construction methods, inspection criteria, maintenance, and preservation (extension of service life).

The TRB meeting and the BDM updating process got me thinking about how our bridge community can positively affect the educational challenges of our existing and future workforce. I’ve been exposed over the years to several educational delivery methods. In the past, most of us attended conferences and went to sessions to discover the latest thinking. Then along came webinars with limited audience questions and answers. Like you, I am most familiar with self-study, eLearning, distance learning, and instructor-led training (ILT) programs. I define these programs as follows:

- Self-study—increasing one’s fundamental knowledge and proficiency through self-paced individual research and study.
- eLearning—computer-based educational programs with online interaction between the student and the preplanned experience.

On December 16, William Nickas gave the keynote speech at the Fall 2021 Sacramento State Precast Bridge Studio Finale at the Sacramento State Union after four integrated civil engineering and construction management student teams presented their design-build projects before a judging panel and other local and national bridge industry mentors and representatives. Photo: Courtesy of Dr. Eric Matsumoto.



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Cover

CDM Smith designed a 9-mile portion of Louisiana Highway One that uses a precast concrete two-lane elevated highway to provide reliable access to Port Fourchon, a major port on the Gulf of Mexico. The photo was taken shortly after completion and before the removal of existing moveable-span bridge.

<https://doi.org/10.15554/asp16.2>

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Publisher

Precast/Prestressed Concrete Institute

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Postmaster: Send address changes to *ASPIRE*, 8770 W. Bryn Mawr Ave., Suite 1150, Chicago, IL 60631. Standard postage paid at Chicago, IL, and additional mailing offices.

ASPIRE (Vol. 16, No. 2), ISSN 1935-2093 is published quarterly by the Precast/Prestressed Concrete Institute.

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eLearning can be supplemented with embedded videos, animations, and embedded knowledge checks.

- Distance learning—computer-based educational programs with online interaction between the student and the presenters or faculty, who can answer questions in real time or via email. Distance learning can be supplemented with online videos, slideshows, homework or required assignments, and so on.
- ILT—an interactive, small-group program with real-time discussion, question and answer sessions, homework, and student-led assignments.

Which method gives us the best opportunity to keep our knowledge fresh? When evaluating the effectiveness (or even appropriateness/relevance) of each of these methods, one must consider the starting point and the desired outcome.

Recently, I had an opportunity to visit Dr. Eric Matsumoto's structural engineering program at California State University, Sacramento, College of Engineering & Computer Science, and was exposed to the exciting teaching and learning environment of an immersive precast concrete bridge studio.

The purpose of this studio program is to provide students with immersive, experiential exposure to precast concrete bridge design, construction, and delivery. Further, the program offers a unique environment for students in the engineering and construction management programs to partner

throughout the program life. The studio draws its strength from its partnerships with precast concrete fabricators, consulting engineering firms, contractors, specialty partners, a bridge software company, and Caltrans. Students must address many key questions: Why are concrete bridges the best solution? What conditions make this solution the most advantageous? How does the choice of precast, prestressed concrete affect bridge design, materials, and construction? How is a prestressed concrete bridge designed, from inception to final detailed design? What supplementary elements such as seismic conditions, site limitations, or innovative materials need consideration?

The final phase of this program requires students to defend their prestressed concrete bridge solution to industry experts. This reminded me of an exit interview from a value engineering proposal or process team report to the upper management at a department of transportation. You could see how well the students understood the needs of the project and the desired outcomes through their recommendations. Students who successfully navigate this rigorous studio program will enter your fabrication facility, consulting firm, or department of transportation with a level of knowledge that will elevate your programs. Well done, Dr. Matsumoto! (See the Professor's Perspective in the Fall 2019 issue of *ASPIRE* to learn more about the Cal State design studio, and the Winter 2022 issue to learn about the precast concrete studio at Idaho State University.)

With this inspiration, I say let's take ILT up

a notch, incorporate a hands-on component, and call it ILT+. Everyone—engineers in the making, seasoned engineers, project managers, construction workers, inspectors—can benefit from hands-on training. Overall, the hands-on experience is valuable and develops a better qualified workforce. We, as individuals, can foster informal ILT+. For example, arrange a field trip for a local university group or your employees, bring hands-on activities to the office, or take a recently hired engineer with you to a jobsite. It's an eye-opener to see an ironworker struggle to install reinforcement that looked so pretty on your computer screen.

I honestly believe ILT is the most effective and impactful educational delivery system—at least for me and these soon-to-be engineers. If I were left to my own self-study or distance learning efforts, I'd soon be overcome by a condition known as OTTD ("Other Things to Do"). This condition—which often comes on slowly, but rapidly becomes debilitating—is characterized by letting anything and everything get in the way of getting something done. I am extremely envious of those of you who are accomplished with self-study and distance learning, and I acknowledge that those platforms are highly successful and very popular with many.

Now I had better put my head down and work with all these subject matter experts to keep this PCI BDM update project moving ahead for the Fall 2022 release date.

It's never too late to educate! 

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