



Training the Structural Engineer

Part 2

By Stan R. Caldwell, P.E., SECB

Unlike the students aspiring to enter many other professions, structural engineering students in most states are not permitted to take their licensing examinations immediately upon graduation. Rather, they must first serve an apprenticeship of three or four years. During this period, they typically have titles such as Engineer-In-Training (EIT), Engineering Intern, or Graduate Engineer. By state law, EITs are required to perform engineering work only under the direct supervision of licensed professional engineers.

Ideally, EITs are exposed to a wide range of projects, from simple to complex, from modest to massive, from new construction to long-overdue renovation, and from their local communities to overseas. They are given the opportunity to work with many different construction materials and frequently visit jobsites to observe ongoing construction. In the office, they become immersed in their firm's structural analysis and design process, from concept through completion. They learn the role of structural engineers, both within their firms and within their project teams.

Mentoring is arguably the most important aspect of workplace training. This is the process by which young engineers are actively coached by the experienced engineers around them. It is a critical process, because it is the only way that knowledge and wisdom are effectively passed from one generation to the next. Good mentors are able to develop close relationships with their EITs. They act as friends, advisors, teachers, coaches, cheerleaders, and in some respects, even as parents.

EITs generally want more guidance, but senior engineers are often reluctant to provide it under the pressure of tight project budgets and schedules. "My door is always open," is a popular approach to mentoring, but is not always viable. Many EITs hesitate to "waste" the time of senior engineers or risk the perceived embarrassment of asking dumb questions. Formal mentoring programs attempt to ensure authenticity by pairing EITs with senior engineers, and holding both parties accountable for frequent and meaningful communication.

Prior to licensure, EITs are expected to tackle ever-increasing engineering challenges and responsibilities, to gain confidence in their abilities, and to earn the confidence of others. Was this your experience as an EIT? What about the EITs who now report to you? Are these outcomes usually achieved in your firm and elsewhere? Very few structural engineering employers have training programs that consistently succeed, and the ones that do tend to be relatively large organizations. Smaller firms, which represent the vast majority of structural engineering employers, present quite a different picture.

Many structural engineering firms attempt to provide EIT training, but lack the project diversity or organizational resources necessary for it to be effective. Other firms put little thought or effort into EIT training and often assign their EITs to menial and repetitive tasks. Unfortunately, some firms simply view EITs as a source of relatively inexpensive and easily disposable labor. They keep the best and cut the rest. In summary, there is no standard workplace training experience today for EITs. As Forrest Gump might say, the situation is like a box of chocolates: "You never know what you're gonna get."

Last year, SEI and NCSEA jointly asked 10,065 structural engineering leaders to participate in an online survey of the profession. The survey was lengthy, but 352 engineers, a respectable 3.5%, agreed to participate. Of these, 48% represented firms with less than 25 employees and 84% represented firms with 25 or fewer structural engineers. About 50% described their employers as structural engineering design firms, and 88% classified themselves as being in the private sector. Additional information on the survey can be found in Appendix A of *A Vision for the Future of Structural Engineering and Structural Engineers: A Case for Change*. This must-read SEI report is available as a free download at www.asce.org/SEI.

With respect to workplace training, the survey results are not encouraging. Only 15% reported that they have formal mentoring programs, and 34% reported no mentoring

of any kind. Slightly more than 80% reported that they support workplace training, mostly in-house, but also online and out-sourced. However, 75% of such training addresses the technical skills intended to increase productivity, and only 25% targets the so-called "soft" skills that are necessary to support career growth. Only 40% reported that they maintain a specific budget for training. Not surprisingly, 75% concluded that their approach to training needs improvement.

There must be a more productive and consistent way to train and mentor young engineers prior to licensure. One radical concept is based on "The Teaching Hospital Model." In this adaptation, leading structural engineering firms will agree to serve as "teaching firms." Working through a professional organization such as SEI or NCSEA, they will create a standardized program to train, mentor, and monitor the progress of the EITs in their workplaces. This organization might also serve as a clearinghouse to distribute new graduates to the teaching firms based on merit, location, and other considerations.

Teaching firms will compensate their EITs fairly, in accordance with their various policies, but may or may not become the permanent employers of the EITs whom they train. In turn, an EIT might work for more than one teaching firm prior to taking the licensing exam. In fact, in an ideal situation, an EIT might spend one year with a U.S. bridge design firm, another with a foreign structural engineering firm, and a third with a U.S. building design firm. That EIT would be uniquely trained and almost certainly would be highly valued by structural engineering employers. ■

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The focus of this two-part article is on training the future structural engineer prior to licensure. Part 1, which appeared in the April 2014 issue, addresses training in the classroom and laboratory.

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