

# The Importance of Mentoring

By GERALD J. "JERRY" WILLIAMS, PE, LEED AP, partner/senior vice president, 8760 Engineering LLC

It was the fall of 1970, and I was a first-semester graduate student in the Building Environmental Systems program at Washington University in St. Louis. I had worked for a consulting engineer doing load calculations during the summer of 1968 and done very well in an undergraduate HVAC class during my senior year. It was the first evening of ME-591, HVAC Systems and Equipment I, and I thought this simply would be a review of a lot of things I already knew; at 22, I was convinced I already possessed all of the tools I needed to be a great engineer.

I was wrong.

The course was taught by William J. "Bill" Coad, and within a few minutes, it was clear this course would be transformative for me.

In 1970, HVAC engineering was a field full of rules of thumb to be followed, load-calculation forms to be filled out, ducts and pipes to be sized, codes to be adhered to, equipment to be selected and applied, and budgets to be met. Bill Coad, however, believed the design of HVAC systems always should begin with the fundamental laws of physics and engineering. He saw the practical (and sometimes mundane) field of HVAC systems to be gloriously rich in the basics of thermodynamics, fluid mechanics, and heat transfer, and he approached every design issue with these fundamentals in mind.

We spent that first class developing the fundamental laws of psychrometrics. Our homework assignment consisted of psychromet-

ric-process problems that needed to be solved from basic principles and without the use of a psychrometric chart. The last problem was to construct a sea-level psychrometric chart using only the Keenan and Keyes steam tables! And, thus, my journey with Bill Coad had begun.

Bill taught two of my graduate courses and acted as my thesis advi-

process, always taking time not only to answer my questions, but to document on a green engineer's pad the key points we discussed and then hand the pages to me for reference. Bill always was anxious to plant seeds of knowledge and cultivate an atmosphere in which learning and growing felt good.

2) Bill was incredibly good at

framing and defining a problem. I would go to his office for help with a design or thought challenge, and his response always was the same: He would slide a pad of paper my way and ask me to draw a picture of the problem. He would say, "If you can't draw a picture of the problem, you don't yet really understand it." But it never stopped there.

3) Bill would not be content until you applied the laws of physics and engineering to solve a problem. With a completed picture in front of you, he would say, "If you can't write an equation for the problem or process, you don't yet really understand it."

4) In doing 1, 2, and 3 above, Bill was cultivating confidence. It always was clear he was going to accompany you on your voyage of discovery. And once a problem was solved, there was a belief the approach would work again.

5) Lunches with Bill were not to be missed. Often, he would present an engineering problem that seemed simple on the surface, but, on further reflection, was not simple at all, requiring a solution obscured by the customary approach of the design community. As I said, Bill was a genius at framing problems.



**The author (seated) with William J. "Bill" Coad (center) and J. Barrie Graham at an ASHRAE Professional Development Seminar on air-system design in San Francisco on May 26, 1982. The three were the seminar's main lecturers from 1982 through 1991. Graham and Coad died in 2008 and 2014, respectively.**

sor. After graduation, I went to work for him, and over the 40 years that followed, he served as not only my employer, but my mentor, my tennis partner, and my trusted friend, gently teaching me to think as an engineer, behave as a professional, and nurture those next in line. Sharing knowledge and giving back were part of Bill's DNA. And, not surprisingly, they became part of mine.

How did he do it? How did he act as mentor to me and so many others so effectively? I could fill many pages with remembrances of my time with Bill, but I'll share just a few:

1) Bill considered face-to-face dialog an integral part of the learning

6) Bill believed the difference between competence and excellence in engineering was a matter not so much of technical knowledge, but of philosophy. To him, the approach to a problem was key: Building on the fundamental concepts of engineering and physics always resulted in a superior solution and sometimes led to a simple and elegant one that advanced the science of HVAC.

So, what did all of this mean for me? Looking back, I can say most of my professional accomplishments—the times I found that elegant solution, the times I pushed the envelope of our knowledge of the science of HVAC, the times the approach made all of the difference to me and the clients I served—came from seeds planted long ago by Bill Coad, many of them sown when I did not yet understand their meaning. It has

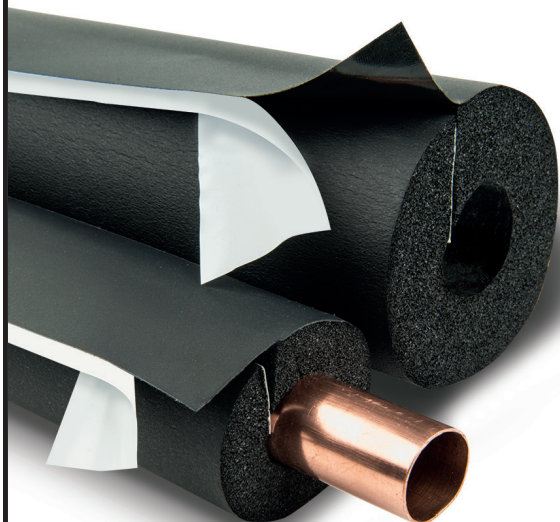
been a long, exciting journey, one that started with a mentor who believed in me and was willing to share his most precious gifts of knowledge and insight for my betterment.

In 2016, how important is mentoring? I would argue it is as vital now as it was in 1970, but perhaps for slightly different reasons. Today, so much information and advice—both good and bad—is just a few keystrokes away. But what are the connections? How did technology get us where we are today? What's really behind the problem you are trying to solve? Thus, it is not only knowledge, but insight and perspective that mentoring can furnish today. And the approach to a problem still sets apart the engineer of competence from the engineer of excellence.

Today, the qualifications for a

mentoring relationship are no different than they were in 1970: someone generous in spirit who is willing to share knowledge and experience on an ongoing basis and someone teachable who recognizes the value to be obtained from such a relationship. The times and the culture have changed, but for those who strive to be the best at what they do, who are seeking that elegant solution, and who are eager to push the envelope, mentoring remains an invaluable source of insight and inspiration. And today it requires mentors who are not threatened by the amazing digital analysis techniques their mentees can utilize in solving engineering problems. These young and talented engineers need someone on whose shoulders they can stand to reach even higher. It has made all of the difference in my life as an engineer.

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