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Architecture, construction and engineering mentor program for the next generation

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Can you remember the first time you were asked: "What do you want to be when you grow up?" In high school, many of us had family members, friends' parents, guidance counselors, or other professionals, who helped steer our career path. Even with those influences, many high school students do not know about the possible careers in the building industry, and terms such as "Construction Management" elicit blank stares. The ACE (architecture, construction, and engineering) Mentor Program strives to change that.

The ACE Mentor Program was founded in 1994 by Charles Thorton, of Thorton Tomasetti. ACE strives to increase awareness, and improve access for high school students to the ACE industry through hands-on, experiential learning. After their experience in the mentor program, many students look to the ACE industry as possibilities for their future careers.

Not only does the program help steer bright high school students to careers in the industry, but it also perpetuates an industry in need rising talent. Industry research shows a potential future shortage of graduates in the ACE fields. More than two-fifths of ACE firms predict a significant shortage of electrical and mechanical engineering graduates starting this year, and a one-third forecast a shortage of structural and civil engineers within five years. The ACE Mentor Program helps combat this forecast.

A 2014 survey of ACE students shows the following characteristics of the program's students: a nearly 99% high school graduation rate (vs. 73.4% national average); 95% college enrollment rate (vs. 68% national average), and over 70% are either studying ACE-related majors in college, or are already working in one of these fields. 86% of ACE alumni attribute their interest in the ACE industry to their participation in the mentor program. ACE also aims to increase diversity in fields known for homogeneity. The same 2014 survey of ACE students indicates that more than 62% of students in the program are minorities, and almost 35% are female. ACE strives to reach out to students from all backgrounds that might not otherwise be aware of the industry.

The schedule, agenda, budget, and program structure differ in each of the 88 affiliated programs but the overall ACE Mentor Program message remains the same. In Boston, students from the greater metropolitan area meet in a centralized location once a week for 16 weeks. The students receive a hypothetical project, such as a community center, a STEM addition to a school, or a pavilion structure. The students split into five groups based on their interests: architecture and design, structural engineering, MEP engineering, civil and landscape, or construction management. The students work in their groups, but are encouraged to coordinate with their peers in other groups. The year culminates with a final presentation, where the students display a cohesive project to peers, family members, teachers, and professionals from the area. This final presentation is where scholarships are awarded to graduating seniors entering college in ACE majors. In the past 19

years, ACE has awarded more than \$14 million nationally.

ACE not only teaches high school students about the ACE industry, but the students also gain valuable life skills in leadership and collaboration that are applicable to any other academic major and/or profession. This article examines the impact of ACE from three different personal perspectives. The first story is from an ACE alumnus student, currently in college for construction management. The second is from an ACE alumnus, that studied engineering in college and became a mentor after starting her career. The final perspective is from a mentor point of view. These anecdotes are examples of how ACE makes an impact on students and the ACE industry as a whole.

Coming into ACE, I expected to learn about the construction process. ACE did exactly that, but I learned more than I could have imagined. In the beginning, I expected to jump right into the discipline I was interested in, instead we learned about all the parties involved in the construction process. I quickly realized that knowing how all disciplines operate would be critical to understanding the coordination required in the industry. Learning about each discipline, allowed me to make a more informed decision and identify which group was the best fit which, for me, is the Construction Management (CM) group.

I enjoyed my experience in ACE so much that I decided to attend college to pursue a career in construction management. I was ultimately accepted into Wentworth Institute of Technology (WIT) for Construction Management.

My first time on the WIT campus, I felt as if I would be pushed to my limits and had second thoughts about attending. However, once classes started I realized that because of ACE I was already familiar with much of the material. Through the valuable foundation ACE provided me, I was then able to focus on the less familiar material. My experience in ACE helps me get the most out of my education at WIT.

Because of ACE and its dedicated mentors, I have a deep appreciation for the other parties involved in the construction process and a comprehensive understanding of the complex processes architects, contractors, and engineers have to navigate. Now, I am confident that I have the skills necessary to build strong relationships in the industry and succeed in the path that I have chosen.

-Obediah Rankin, 2010 ACE of Massachusetts graduate, Candidate for Bachelor of Science in Construction Management at Wentworth Institute of Technology

I first became involved in ACE during my senior year of high school when a teacher approached me because they were looking for architecturally-minded students. I had never heard of the program before, but I was willing to give it a try. I credit ACE with opening my eyes to engineering and architecture as relevant career paths through the program's hands-on, application-focused approach. The introduction that my mentors gave me to construction management, structural engineering, and architecture fascinated me because it brought a practical meaning to everything I was learning in my math and science classes. Instead of just drawing arbitrary, free-body diagrams or solving calculus derivatives, we were learning about wind forces and the thought process for practically laying out a useable space. The ACE group project challenged me in a way that essays and lab reports did not because it was an opportunity for me to take the theoretical concepts we had learned and translate them to relevant applications.

Over the course of my year with ACE, I started applying to college and selecting a major. I settled on

structural engineering because, in my mind, it was the perfect blend of aesthetic vision and technical prowess. It was a major where I could still apply the architectural concepts I had learned, but also use my math and science skills. I chose Princeton University because I appreciated its academic program where I could work closely with architecture students as a part of my engineering curriculum. This desire for collaboration stayed with me as I selected my first job at Simpson Gumpertz & Heger, a local engineering firm, because it was important for me to work with a team that valued developing reciprocal relationships with architects.

I pursued the opportunity to serve as a structural engineering mentor in the ACE mentor program. I knew how formative my ACE experience was to both my academic and professional development and I wanted to share my perspective with students by engaging them with creative applications of what they learn in school and by teaching them how they can be the catalyst for collaboration among their peers since their generation is the future of our ACE disciplines.

-Cecily King, 2006 ACE of New Jersey Graduate, former ACE of Massachusetts mentor, formerly of Simpson Gumpertz & Heger

Professionals become ACE mentors for many different reasons. There are the altruistic reasons of helping others and giving back to our chosen profession. There is the less noble reason of networking with other professionals to further our careers. No matter the reason, the result is that we help high school students understand what we do and why we love doing it. In teaching these students about our work, we attract them to the ACE industries. In the future, this will help perpetuate what we do in the building industry. Instead of convincing a student to choose a certain profession, we try to attract them to the ACE industry as a whole. There are many students who try a certain discipline and decide to try something else the following year in ACE or even in college.

The mentoring itself is a collaborative effort among all mentors, not just the mentors of a given discipline. The students receive the "it takes a village to raise a child" approach from the mentors within a team. We work together to eliminate the typical industry stereotypes and by doing so, set a good example for the students. When faced with a project decision, we teach the students to ask questions. This approach impacts the students' understanding of the industry in different ways. First and foremost, it teaches them that the decisions of a group affect everyone, and we must work together as a project team to find the optimal solution for the "client". Through this work, the students learn the skills of compromise and respecting others' opinions. Additionally, the students gain a perspective on what each of the disciplines must consider in the design and construction process.

As we work together to mentor and teach these high school students, we the mentors, benefit from the powerful lessons. Too many times in our work we make decisions without considering the impact on the rest of the project. Sometimes, all it would take to get to a successful result is for us to open the lines of communication with a phone call or email to ask a question before we embark on a path that instead leads to wasted time and effort. Taking these lessons back to work with us allows us to become design partners in projects not just separate parties working on the same project.

-Mike Tecci, PE. ACE of Massachusetts mentor and board member, Senior Staff II at Simpson Gumpertz & Heger.

ACE exists because of its underlying mission: to engage, excite, and enlighten high school students to pursue careers in architecture, engineering and construction through mentoring, and to support their continued advancement in the industry. Certain moments make us aware of the impact that

the program has on students. One Saturday morning last fall, ACE of Massachusetts alumni students attended a design charrette at an elementary school to help design a new playground for the school. The alumni stressed how much ACE affected their lives and they wanted to give back and help wherever they could, but the reality is that the mentors themselves are also positively affected by the program. Instead of seeing the other professions as impediments to the design vision, we have grown to see each other as partners bringing unique skills and experiences together to reach the optimal end goal. ACE not only helps the students and mentors, but also the architecture, construction, and engineering industry as a whole by further developing a collaborative environment.

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