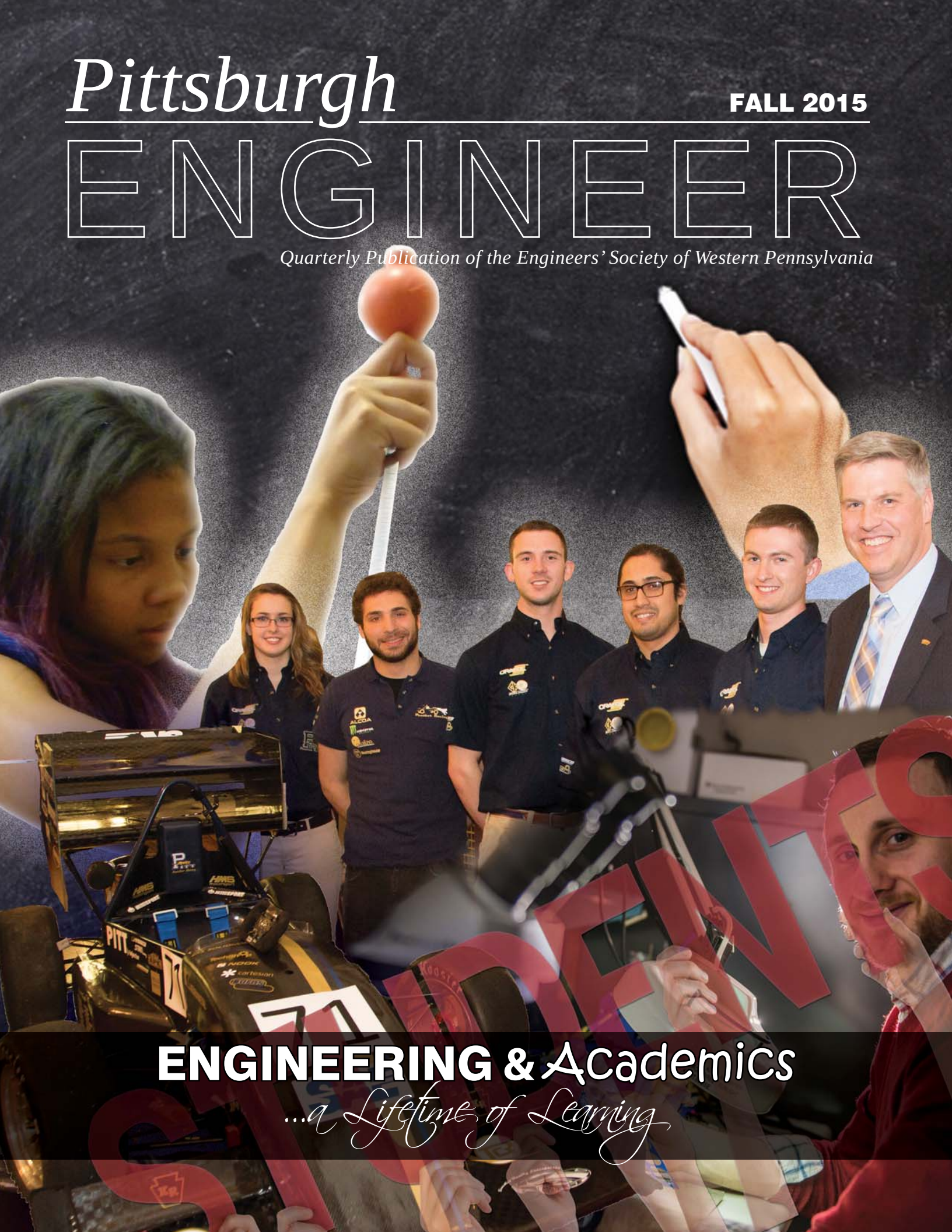
Pittsburgh
FALL 2015

ENGINEER

Quarterly Publication of the Engineers' Society of Western Pennsylvania



ENGINEERING & Academics

...a Lifetime of Learning

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In this issue...

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Guest Editor Column

By Tanya McCoy-Caretti

Engineering and Academics
...a Lifetime of Learning

Tanya McCoy-Caretti

There was a day when it was not out of the ordinary to find ash trays on desks, boxes and boxes of carbon paper in the supply closet, and calculators the size of copy machines in the office! Ok, perhaps the calculator size is a bit of an exaggeration, but who would have thought that there would come a day when your calculator would be on your phone, edits to a letter would be accomplished by a simple find and replace function, and that if you wanted to grab a quick smoke you'd be donning your coat and hitting the sidewalk ten feet from the entrance to your building??

As the atmosphere in our office has changed, so too has the environment within the classroom that got us there. In this quarters issue of the magazine we are going to take a look at the past, present and future of education in engineering. Several of our members have shared with us their experiences in the classroom and how the tools, the technology, and the atmosphere has changed over time.

The engineer, as the problem solver, has experienced an evolution in tools over the years that can at times boggle the mind. But if you sit back and listen to them talk about their personal histories it's captivating to hear the octogenarian explain how "he" started out as a draftsman or surveyor and finished school in a very practical manner on the GI bill and "got right to work solving problems"; to listen to "him" and a few more "her's" in their 50's and 60's compare the model number of the Texas Instrument calculator that lived with them day and night for four long years; and finally to listen to the new generation of young engineers who are solving problems by doing, not in the classroom but by traveling abroad to developing countries bringing water, electricity, and basic human needs to the villages they are working in.

Yes the times have changed, the tools have changed, and the engineer has changed, but if there is one thing that has remained constant it is the engineers need to solve a problem. My favorite visual of the "engineer" in action is depicted in the movie Apollo 13, CO2 levels inside the cabin have risen to a critical level and when presenting the problem to Gene Kranz his response to his team is, "I suggest you gentleman find a way to put a square peg into a round hole, quickly." The next scene finds us "downstairs" where a team of engineers have been assembled because, "the people upstairs have handed us this one and we need to come through". It wasn't science or math that found a way to put a square peg into a round hole, but a group of problem solvers whose basic genetic make-up will not allow them to not solve the problem. They dug in using all of the tools at their disposal (including the science and math) and the men of Apollo 13 made it home.

HOW THE CLASSROOM HAS CHANGED OVER TIME

According to the National Academy of Engineering, most engineers today are likely to recall their undergraduate years as a period of intense mathematical and theoretical study. Until the 1940s, however, the engineering curriculum at most colleges and universities was mostly practical, with the emphasis on engineering design rather than on engineering science and mathematical applications. The field, and undergraduate education programs, changed dramatically with increased federal support for university research after World War II. As engineering schools hired faculty to teach and conduct scientific research, the number of faculty members with industry experience declined. Eventually, courses in advanced mathematics and theory replaced practical courses in machining, surveying, and drawing (Prados et al., 2005)[1].

The strong emphasis on technical knowledge and skills, and resulting improvements in defense-related technologies and applications, served the United States well during the war and postwar years, but, by the 1980s, economic shifts from defense to commercial applications left engineering employers dissatisfied. New graduates were technically well prepared but lacked the professional skills for success in a competitive, innovative, global marketplace. Employers complained that new hires had poor communication and teamwork skills and did not appreciate the social and nontechnical influences on engineering solutions and quality processes. The resulting change is yet the most recent shift back to an emphasis on practical experiences that today's student is receiving by participating "hand on" in college programs such as Engineers without Boarders and grade school and high school programs such as STEM.

We encourage you to reflect a bit on your own personal experiences as you enjoy this issue of the magazine. Consider that it's not so much what students are learning today that makes them who they are, but the collective knowledge of all of our experiences shared with one another that continues to propel this problem solving profession into the next generation and beyond.

About the Author...

Tanya McCoy-Caretti is ARCADIS' Pennsylvania Market Area Manager. Tanya has spent the past ten years providing her public sector client base with engineering and consulting support in the areas of development/redevelopment, solid waste management, water/wastewater and stormwater management, grant writing and project/program financing. Prior to entering the consulting arena Tanya was the client – she began her career following graduation from the University of Pittsburgh in county government in Pennsylvania, serving the first four years in county planning and the last 10 as the Executive Director of the Cambria County Solid Waste Management Authority. In addition to leading ARCADIS' public sector pursuits in Pennsylvania, Tanya continues to serve on Pennsylvania's Solid Waste Advisory Committee, the Pennsylvania Municipal Authorities Association legislative committee, and the ESWP publications committee.

1. Prados, J. W., Peterson, G. D., Lattuca, L.R. (2005). Quality assurance of engineering education through accreditation: the impact of engineering criteria 2000 and its global influence. Journal of Engineering Education, Volume 94, Issue 1, P 165-184.

...a Lifetime of Learning, Part 2


Wendy Berrill


Sailesh Kapadia


Joshua Jedlicka


Harvey S. Borovetz


David Borneman

To better understand how the engineering profession has changed with the times, the Publications Committee surveyed some ESWP members from various backgrounds. Here is a sampling of their experiences in the workplace and classroom...

WENDY BERRILL

In the classroom – what tools did you use?
Most of what we used was paper and pen and calculators. There weren't individual computers for each student unless it was a computer programming or CAD class and no one really brought their own laptops. Some computer-based classes were held in computer lab classrooms where each student sat at a desktop computer and worked with the software, but that was probably only about 10% of my classes.

On the job – what were some of the tools you used on your first job?
I used a computer and software programs when I first started and still am using the same tools today. There have been a few advances in the field, but I don't work much in the field so I'm not that familiar with those tools.

How many advances in technology have you seen in the engineering field since graduating from college?
I haven't been out of college a great length of time so I haven't seen that many advances in technology, but there have been some. I am a highway design engineer so I use Google Maps/Earth a lot to check out existing conditions and road configurations. Since I started out of college, there have been quite a few advances with those programs. Google Street View was implemented, many birds eye view features, and a lot better graphics and aerials of a lot more areas. The computer software I use for highway design has been upgraded a few times since I started as well. I've used Microstation and InRoads for the past 11 years now and I have had to upgrade the programs 4 times in that time. Each upgrade has provided some really great and helpful tools and also some not so helpful upgrades. There have also been the advances in deliverables for submissions. We used to have to print many sets of drawings to deliver to the client on submission day, but now we just have to create PDFs and email the submission over.

If you've only been an engineer for a short time – what advances in technology do you anticipate seeing over the course of your career?
Since I've seen a good amount already in the short time I've been an engineer, I would assume I am going to see big changes over the course of my career. I would anticipate quite a few more upgrades to the software we use and even to the technology/computers we use. Who knows, by the time I retire we might not even be using computers anymore.

What advice would you provide to those considering engineering as a profession?
Always 'fill the holes' and do the work that no one else wants to do. This can provide you with a lot of opportunity and always makes you a valuable employee. Sometimes these things can be the most rewarding and sometimes they can lead to bigger and better things.

Wendy Berrill is a Civil Engineer at Michael Baker International. Her education includes a Bachelor of Science in Civil and Environmental Engineering from University of Pittsburgh, and Master of Business Administration from Robert Morris University. Ms. Berrill also interned at Michael Baker International for two summers while attending the University of Pittsburgh.

SAILESH KAPADIA

Was your degree program a two year program, a four year program, did it involve an apprenticeship program?
My degree was a FIVE YEAR program and included extensive curriculum in ALL branches of Engineering with the final two years focusing on Mechanical Engineering.

In the classroom – what tools did you use?
Slide-rule in undergraduate and computer in Graduate Schools.

On the job – what were some of the tools you used on your first job?
Freiden Calculator (pre-electronic calculators).

What advances in technology do you anticipate seeing over the coming years?
I am at the end of my career but I do expect biotechnology to be a major contributor to our economic progress.

How has the make-up of the engineering profession as a whole changed since you graduated from college?
More engineers are drawn into administrative functions and seems to be less emphasis on design and creativity activities except in a few select companies. Of course, I believe engineers can do anything better than anyone else based on their rigorous discipline acquired through a super-full load of course work during their Bachelor's degree (typically 18 to 21 credits compared to 12 to 15 for the liberal arts types of curricula) and so it is natural that they would gravitate towards activities most in demand (and therefore, more lucrative). Our economy is changing and the workforce (including engineers) focuses on different roles.

Do you have a specific story/anecdote you'd like to share with your fellow engineers? There was a time in my career when I had to get a construction project completed in a faster than normal time and a complicated piping had to be welded to a device and the design folks said they would need TWO WEEKS to do the layout because of the three-dimensional complexity of the flow conduits –this was when design and drawing was done on a drafting board. I asked them to define a cylindrical volume around the device in which all the piping was to be configured. I had a technician make a cardboard cylinder of that volume and gave it to the plumbers and pipe fitters along with the schematic of the piping and told them to build the piping so that it stayed within the space defined by the cardboard cylinder. The piping was done in less than a week and then I asked the design folks to draft the design as built.

Sailesh Kapadia worked for PPG Industries, Kerotest Industries and PTC Alliance over his career. Since then he has consulted for various manufacturing companies in Six Sigma and ISO. His education includes Tech. IIT Bombay, MSME from North Dakota State University; and an MBA from the University of Pittsburgh. Mr. Kapadia is currently trying to wind down consulting assignments.

JOSHUA JEDLICKA

What advances in technology do you anticipate seeing over the course of your career?

- Automation of labor through robotics, intelligent systems and 3D printing can absolutely revolutionize transportation, construction and urban planning functions. This will have a profound impact on the ability to safely and cost effectively build and maintain complex infrastructure projects, but the potential shift in labor demand that could result will be a challenge that society must embrace with equally innovative economic and social policies.
- Ongoing mitigation and adaptation efforts of global climate change will change how economies and governments are structured and require engineers to think beyond the technical challenges and grow their influence on social policies.
- Feeding a growing population will require some of the most globally integrated and coordinated engineering systems in the world.

Any advice you would give to those considering a career in engineering?

As long as there are humans, the planet will never run out of things in need of improvement. If you have a passion for any of the numerous ways that engineers design, manage, test, fix, break, and re-fix the world around us every day throughout dozens of industries, you should seek it out; there's likely a job open for you somewhere.

Do you have a specific story you'd like to share with your fellow engineers?

I was a student at Virginia Tech on campus the morning of April 16, 2007. The world lost some incredible people that day including several of my peers in civil and environmental engineering. That day continually reminds me that there are challenges that will consume the technical vigor of engineers, but we should not let that distract us from the joys of our work, supporting and appreciating the work of our colleagues and ensuring we continually evolve the idea of how engineers can contribute toward the greater benefit of society.

Joshua Jedlicka, P.E. is a Water Resources Engineer with CDM Smith. His education includes B.S. Civil and Environmental Engineering, Virginia Tech 2007, and M.S. Environmental Engineering, University of Pittsburgh, 2011.

HARVEY S. BOROVETZ

In the classroom – what tools did you use?

Slide rule, digital computer/card deck

How many advances in technology have you seen in the engineering field since graduating from college?

My bioengineering education began in graduate school at Carnegie Mellon. When I began graduate school, copy machines were just being introduced, the newest calculators (8"x 5"x2") were 4-function (+,-,*,/) and cost $300, computing was done with IBM punch cards and card readers, we typed our dissertations by hand using a typewriter, carbon paper, and white out...how many advances in technology have I seen? ...let me count the ways!

Would you consider these advances good for the profession and the industry?

My work has focused on R&D for treating cardiovascular patients. Over the decades the advances have been remarkable in providing both longer life as well as improved quality of life. Regulatory challenges are considerable, but I remain optimistic that future bio-engineers will not only address unmet clinical needs through their technological backgrounds, but also contribute to the eradication of diseases to the benefit of us all.

Any advice for those considering engineering as a profession?

I tell young students to follow their professional passion, wherever it might lead. I encourage them that their baccalaureate years are the time to take risks as far as their professional careers are concerned. I encourage them to consider minor subjects, certificates and other educational opportunities in addition to their major subject. I strongly recommend that they become involved in undergraduate research, both locally, and through the many Research Experience for Undergraduate Programs, that are available across the U.S. I also advise students to consider International Programs, whether for a week, a summer or a semester, given that the "world is flat" and that the engineering profession is becoming more global each and every day.

Dr. Harvey Borovetz is a Distinguished Professor and former Chair (2002-2013) in the Department of Bioengineering, Swanson School of Engineering at the University of Pittsburgh, the Robert L. Hardesty Professor in the Department of Surgery, University of Pittsburgh School of Medicine, a Professor of Chemical and Petroleum Engineering and a Professor – Clinical and Translational Science Institute. Within the McGowan Institute for Regenerative Medicine, Dr. Borovetz holds the position of Deputy Director of Artificial Organs and Medical Devices.
His education includes Brandeis University, Waltham, MA, B.A., Physics; California State College, Long Beach, CA, Carnegie-Mellon University, Pittsburgh, PA, M.S., Bioengineering; and Carnegie-Mellon University, Pittsburgh, PA, Ph.D., Bioengineering.

DAVID BORNEMAN

In the classroom – what tools did you use?

Initially slide rule, Fortran and keypunch cards, TI 30 calculator, wrote water quality program on Basic language computer for Senior thesis.

Provide some examples of your college courses...

Soil mechanics, Calculus, Physics, Differential Equations, English, Chemistry, Engineering Graphics and Analysis, Statics and Dynamics, Surveying, Geology, Fluid Mechanics, Applied Hydraulics, Thermodynamics, Art and Art History, Religion and Psychology, Logic, Material Testing, Reinforced Concrete Design, Structural Analysis, Transportation, Sanitary Engineering, Speech...

Would you consider all, some, most of the advances good for the profession and the industry?

Over all good but basic engineering principles may be compromised. Equipment and technology are tools. They alone don't solve problems, people solve problems...people should still check other person's work. Use of current technology and tools are expensive and sometimes lessen the human knowledge of the engineered principle, product or solution. Communications are lessened as well. Sometimes engineers are dependent on the technological tool when they could possibly have solved a simple problem more efficiently in time and cost.

How has the make-up of the engineering profession as a whole changed since you graduated from college?

Smart Phones, Computers and the internet have changed the office workplace dramatically and the budget in terms of time and cost. No headquarters. Work from Satellite offices, transient workforce and different time zones cause challenges for communications and product development.

Do you have any anecdotes you'd like to share with your fellow engineers?

My freshman year engineering project was to design a solar heating system for a mobile home...a fellow student and I proposed a solar heating system using water as the thermal fluid recirculating on the rooftop using pumps and a massive rock bed under the mobile home that would store the heat ...the professor politely said how mobile is it, and what is the weight of your system? Anytime you have to analyze a problem or design a solution, first listen to the given conditions and purpose and always remember the weight!

Dave Borneman has been the Director of Engineering and Construction at ALCOSAN since 1997. Overall, Dave has over 35 years of public service experience managing various water and wastewater capital improvement programs in Southwestern Pennsylvania. These include programs while employed at ALCOSAN and previously with the City of Pittsburgh, Pittsburgh Water & Sewer Authority and the Pennsylvania Department of Environmental Resources (now the PA Department of Environmental Protection). Dave's education includes a Bachelor of Civil Engineering Degree 1979, from Villanova University,

WHAT THEY DIDN'T TEACH YOU IN ENGINEERING SCHOOL

By: Marjorie Burren

If you're studying to be an engineer, you are probably spending a good deal of your time studying math and science, learning how to do surveys, analyze data, design complicated charts and graphs, etc. All of which are invaluable in doing your job as an engineer. If you have been out in the field as a PE, you probably studied all those things in school, and now have discovered that the "Real World" of engineering is more complex and varied beyond those engineering skills.

I have been working as a consultant in the Engineering/Architecture/Construction Management world for almost 20 years, and want to share with you some of the things you may not have learned in school. I hope these tips help you in the real world, whether you are there yet or not—and what an exciting world it is. Very few things we take for granted in life–cell phones, electricity, computers, and clean running water–would be here for our convenience without some good engineering.

DEVELOP YOUR SPEAKING SKILLS

I have asked many colleagues over the years how much of their time they spend speaking, either at a meeting, on the phone, presenting to a project to a client, or the community. Most all of them say between 60–70% of their time! So once you become a professional engineer, you are going to probably spend just as much of your time speaking about what you do, than actually doing it.

If you are in school, try to take any course you can that will improve your persuasive speaking skills – an acting course, a debate or rhetoric course, or just a regular speaking course. Or find an acting class in your area. Standing up to speak is a high source of anxiety for most people. You will have a leg up if you have developed your style. It will also help advance your career. If a company can't count on you to speak – with your colleagues, or a client, or to a community – it can impede your business development.

I teach at my local University's Design Studio, where our future architects are developing. Some comments I have received from my seminar participants include:

"One of the most memorable things you said was, "We are born very expressive, but with time we become smaller." I really needed to hear that. Thank you. And it's okay to not be a perfect presenter because a lot of people struggle with it, but that we can improve if we want to."

"We are always working so hard on the content itself that the presentation is an afterthought at best and not a consideration at all at worst…the biggest thing that I will be working on is what to do with my hands, I usually kept them clasped in front of me or behind me and didn't realize that I was sending undesirable messages to the audience."

Style: I often receive quotes that thank me for helping the speaker develop their style. How do you work on your style? It is very important that you develop a speaking style, one that suits your temperament. Not everyone is extroverted and outgoing; actually, most analytic types, like engineers, tend to be more introverted and less outgoing. It doesn't matter; you can still develop a good speaking style. Some tips:

- Work on your opening: that is the hardest part of any talk, it's that moment between sitting comfortably in your chair and suddenly standing up and being looked at. Try an opening that is a fun quote, a statistic, or something in the news that's recent and relevant to your topic. But it should launch you with a certain kind of energy.
- Don't stand behind a podium: it is a barrier between you and your audience.
- Be physical: speaking is more athletic than mental. Use your body, gesture to explain things.
- Design visuals that help you stay organized, but avoid too many words. An audience will get bored and they don't really help you as a speaker.
- Be creative: If you think of an interesting idea, or prop to use, try it out.
- Try to approach the speaking opportunity with anticipation, rather than dread.
- Practice, practice, practice: even experienced speakers who look like they're "winging it," probably aren't.

And remember: whenever you get up to speak, no one wants you to fail. They are hoping you will do well.

WORK AND PLAY WELL WITH OTHERS – WORK AS A TEAM

When I was a child, we were actually graded on how well we worked and played well with others. It seemed silly to me as a small child, but as an adult, I definitely realize how important it is.

If you are working on a project, whether it's designing or renovating a water treatment plant, improving a highway, or building a new bridge or transit system, you can be assured that you will be working as a team with people from different disciplines. Whatever the delivery method, they all involve some sort of collaboration. It has become apparent over time that the best ideas come from a collaboration of different disciplines. An architect should try to design an esthetically pleasing structure in conjunction with an engineer's sound principles, and then make sure that it can be built properly, that the construction manager knows the right materials are available, priced well, and takes into account the contracting climate.

No matter the delivery method, you will be working with people from different disciplines. Learn some of their language. What does it mean when an architect talks about "contextual design" or the "skin" of a building? Why do Construction Managers want to avoid "Change Orders?" Ask if you don't know. And try not to talk in engineering jargon. Avoid the "ize" words – minimize, maximize, optimize. Use simple clear language that everyone can understand. Rather than "implement strategies," try "this is how we'll approach it." Or, "here are our ideas…" And then give clear steps that

show how you will achieve your goals.

Always try to avoid acronyms - an EIS or a TBM or EAMS might mean one thing to one discipline, but perhaps something entirely different to another. No one is interested in how many acronyms you know. It doesn't make you sound smarter, it's only confusing. When you must use acronyms, always take a moment to let everyone know what they mean first, don't assume that everyone knows what you are talking about. "So our approach to a successful EIS, an "Environmental Impact Statement", will be…."

And remember–you are all there with one common goal: to deliver a superior project.

BEGIN WITH THE END IN MIND

We can all sometimes get so immersed in what we're doing that we forget that when it's completed, other people will have to use it, operate, and maintain it. Whether it's an office building, a bridge, or a power plant, start with the end in mind. As you're designing, ask for input from the end user. What things would they like included? How can you make their life easier?

The great 20th Century architect Frank Lloyd Wright established a School of Architecture. He taught his students not only how to design a beautiful functional building, but before they turned over a house to a client, they had to spend the night in it, and make sure everything was in place the way someone living there would want it. He felt that only by actually "living" in it , if only for a night, would you realize what may have been missing - a light switch in a certain location, a lock on the wrong side of the door, or some other difficulty that you could fix before asking the "end user," the people living in the house, to live there.

Wright also insisted that his students experience the lives of the people for whom they were designing. His clients were mostly wealthy, so he had his students engage in things like concerts, and elaborate dinner parties, which were part of their clients' life style. Try to envision yourself in the environment you are designing. How will it work for the end user? Does it fit their needs? Is it easily maintainable? And be prepared to help with the commissioning, when you actually turn the key over to the people who will be using it. Sometimes a manual can be long and dense; think about doing a presentation at the end to explain some of the intricacies of what you have done, and ideas to help them use these ideas efficiently.

LEARN ABOUT DIFFERENT CULTURES

People behave, and dress, differently in different parts of the USA – and the world. New Yorkers tend to dress formally in business, and are generally fast and assertive, so don't be too shy and passive around them. They will get impatient.

Southerners are polite, and one must always start with some sort of nicety – how is their family, comment on the weather, etc. before you dive into business.

Mid Westerners tend to be somewhat conservative, and respect solid values and sincerity. Don't go for the avant-garde approach in Iowa.

Folks on the West Coast are very environmentally conscious. Some firms in San Francisco are forbidden to use plastic bottles, so don't show up to a meeting there with plastic bottles on hand. They are also somewhat more laid back, and dress more casually as well. You might feel a bit out of place wearing a formal suit to a meeting in Los Angeles. But you would feel quite at home wearing one if you were presenting to a client in South America, or Europe, where they tend to be more formal in their business attire. These are generalities, but it's important to know your audience, and their cultural mores.

If you are fortunate enough to work for a company with global ties, you could find yourself invited to work on projects in different countries, or to attend corporate training functions at your company's global headquarters. Paying attention to language, idioms, dress, customs and culture is extremely important. Do some research before you arrive.

In the transportation industry, for example, most Project Managers and engineers work wherever the most interesting opportunities lie. Whether it's an airport in Singapore, or a new Rail System in England, there will come a time when it may be a good career move to work in another country.

Read up about that country. Learn some of their language, idioms and customs. In the UK, for example, they call a line a "queue," and a train a "tram." (And ice cream is "ices"). There were actually 2 versions of the Harry Potter series published, one in the original "British" English, the other "translated" into "American" English, so kids could understand it.

In Japan, and much of Asia, there is a custom of bowing, usually led by whomever is the highest ranking person in the room. Learn to follow their lead. If you are taken to a group dinner, eat whatever is put in front of you, politely. Even if only a small taste.

It is also accepted practice in Asia to bring a gift for your host, and they will probably give you a gift as well. (As opposed to the US, where public agencies have strict rules about the getting and receiving of gifts.) It needn't be extravagant; it is just a courtesy. They especially like something distinctively from the USA –

- A college Tee-shirt
- A photo book of the Grand Canyon
- A small piece of artwork or something hand crafted
- Something of interest specifically from your state.

I worked on a project in the Middle East, and the whole

team was given an "etiquette" briefing, so we didn't accidentally insult anyone in the room. For instance, throughout the Middle East, it is highly insulting to ever display the bottom of your shoe. A curse is to call someone "the licker of the bottom of your shoe." These are ancient cultures, and if you were walking around a market, you were walking on a dirty surface, and chances are whatever adhered to the bottom of your shoe was highly unsavory.

So if you are someone who habitually crosses your leg by laying your foot on the opposite knee, thereby exposing the bottom of your shoe to a room of people, in Saudi Arabia, for instance, you have effectively cursed and alienated everyone there.

A funny side note: Sadam Hussein was the President of Iraq during the administration of the First President George Bush. We were in an enemy situation with that country, and went to war for a period of time. The president always referred to him publicly as "Sad-Am," which means "the licker of the bottom of your shoe," a huge insult in that country. The real pronunciation of his name was "Sod-Um." President Bush was a sophisticated man; he probably knew how to pronounce his name correctly. He was insulting him publicly, in a possibly calculated fashion. Don't do it inadvertently, and then wonder why everyone in the room suddenly feels like an enemy.

COMMUNICATE, COMMUNICATE, COMMUNICATE!

If you are speaking in front of a multi-cultural group or a diverse group from different countries, speak especially slowly and clearly. Remember, they are translating what you are saying in their heads from English to whatever their native tongue (or regionalism, in this country), and that takes a few seconds. And keep your language clear, simple and accessible. Design and work with visuals that help illustrate your point, rather than fill the screen with boring words and incomprehensible phrases or acronyms.

Take all that wonderful knowledge you are absorbing in school, and now go out into the real world and prosper. And if you are already out there, a few useful tips like the ones I have written here will help you have a successful career.

About the Author...

Marjorie Burren is a graduate of Hunter College with multifaceted corporate experience. She has produced educational films for Harcourt Brace Jovanovich, and was a sales manager for Mattel Toys. She has been a corporate spokesperson for Digital, Liberty Mutual, and NYNEX, and is co-founder of the U.S. Improvisational Theater League. An experienced TV and radio actress, she has taught improvisational theatre in Boston, and has been a guest artist/lecturer at Emerson and Curry Colleges, ASU Graduate Studies Program, and the Thunderbird School of Management in Arizona. For the past 20 years, Marjorie has been coaching individuals and teams in sales and business presentations.

Point Park University's Engineering Technology and Management Programs Offer Real-World Education, Flexibility for Working Professionals

By Amanda Dabbs

Located in the heart of Downtown Pittsburgh, Point Park University offers bachelor and associate degrees in civil, electrical and mechanical engineering technology, a master's degree in engineering management and credential programs in digital electronics technology and electrical power technology.

"What sets Point Park apart from other universities in the region is our niche for offering nontraditional students with all evening and weekend classes so they are able to pursue their degree while continuing to work full time during the day," remarked Gregg Johnson, Ph.D., associate professor of electrical engineering technology and chair of the Department of Natural Sciences and Engineering Technology at Point Park.

Approximately 50 percent of Point Park's engineering technology and engineering management majors are nontraditional students, while the other half is comprised of traditional domestic and international students.

"They were very much there for me when I needed help and were also very understanding of students who were working during the day and going to school at night," said Michelle Choo Loeffler, a 2008 B.S. in electrical engineering technology graduate and senior project engineer for Intertek USA in Oakdale, Minn.

Bachelor of Science in civil engineering technology 2013 graduate Brandy Miller also appreciated the flexibility Point Park and its professors offered.

"Point Park University provided high-quality classes and instruction, and the best schedule for a working woman with a family," remarked Miller, a civil engineer trainee for PennDOT Engineering District 11.

Traditional students like Jacob Rumski enjoyed having small class sizes, full-time faculty who teach both lab and theory classes and access to professionals who work for key engineering firms in the area.

"I definitely enjoyed the people I got to meet in my classes and the knowledge I gained from my professors and from working with my fellow students. The courses were always interesting and the labs that accompany most of the classes were a blast," explained Jacob Rumski, a 2014 mechanical engineering technology graduate.

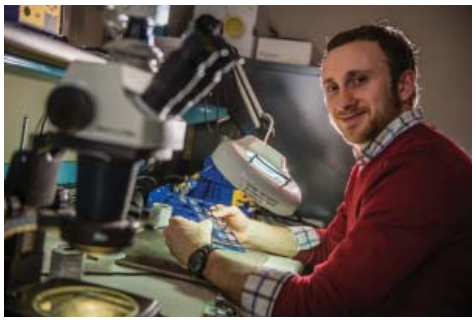
"I always walked away from these classes knowing that I had gained a better understanding of the concepts of engineering," added Rumski, who now works for Stevens Engineers & Constructors in Canonsburg, PA.

POINT PARK UNIVERSITY

"As a student at Point Park, you really have no one between you and the professor. We'll know your first name after two weeks," said Johnson.

UNDERGRADUATE PROGRAMS IN ENGINEERING TECHNOLOGY

A strong emphasis on real-world education is the foundation of Point Park's engineering technology and credential undergraduate programs. As early as their first semester, students engage in laboratory activities that complement and enhance the curriculum they are learning in the classroom.



Ian Lupo '14, B.S. in electrical engineering technology graduate and electrical engineer for Industrial Scientific Corporation

"The University has so many hands-on laboratory classes in civil engineering technology, from concrete testing to creating your own concrete mix design, soils testing and fluids equipment, and the latest software used at popular businesses in the industry," explained Miller.

On campus, Point Park students have access to specialized laboratories on circuits, digital electronics, electrical power, radio, heat transfer/fluids, materials, simulation, soils, geology and surveying.

"It was important for me to be able to get into a classroom and do some hands-on learning," said Ian Lupo, who was promoted from a senior electro-mechanical technician position to an electrical engineer at Industrial Scientific Corporation upon graduating from Point Park in 2014 with a B.S. in electrical engineering technology.

Point Park's civil, electrical and mechanical engineering technology Bachelor of Science degrees are accredited by the Engineering Technology Accreditation Commission of ABET (www.abet.org), which requires programs to demonstrate their excellence during rigorous, objective, periodic reviews conducted by external evaluators.

GRADUATE PROGRAM IN ENGINEERING MANAGEMENT

Point Park's 30-credit Master of Science in engineering management program teaches students to understand the complex technical, ethical and legal issues facing engineering and technology-based industries.

With classes meeting in the evenings or on Saturdays, the M.S. program's delivery format is designed to accommodate working adults.

"Point Park had an affordable tuition program and the Master of Science in Engineering Management program had all the classes I was interested in and more," said Kenny Casado, a 2010 M.S. in engineering management alumna and supplier quality engineer for Philips.

Casado, who is originally from Santo Domingo, Dominican Republic, also chose Point Park because of its warm welcoming of international students.

"It was good to not feel alone and know that other people were having similar experiences as me," she said.

Arthur Chileshe '07, '10, B.S. in electrical engineering technology and M.S. in engineering management graduate and distribution design engineer for Duquesne Light Company

Arthur Chileshe also was an international student at Point Park. A native of Lusaka, Zambia, he chose the University for its small class sizes and the opportunity for personalized attention from professors.

"I got to spend a lot of time in the lab, and having that personal attention from professors turned out to be extremely important for my success," said Chileshe, who majored in electrical engineering technology.

Chileshe decided to continue at Point Park, earning his M.S. in engineering management in 2010 and becoming a distribution design engineer for Duquesne Light Company.

"I enjoyed the Master of Science in engineering management program which introduced me to the project management side of engineering and truly rounded out my education," remarked Chileshe.

POINT PARK'S ENGINEERING TECHNOLOGY FACULTY

Kenny Casado '10, M.S. in engineering management graduate and supplier quality engineer for Philips

Full-time faculty with specialized industrial knowledge and adjuncts who are practicing engineers teach all of the courses in Point Park's engineering technology and engineering management programs.

"We teach based on our real-world engineering experience and are dedicated to preparing our students for the real-world demands of the workplace," said Johnson.

"In class, the engineering technology professors at Point Park always referenced their previous job experiences and pointed out the relevance of our course work to the industry. They always wanted us to get the most out of our classes," remarked Lupo.

"I had a great experience at Point Park as a graduate engineering technology student. I met an amazing group of professors and faculty who encouraged me to excel in every class I took," said Casado.

Michelle Choo Loeffler '08, B.S. in electrical engineering technology graduate and senior project engineer for Intertek USA

Colston Cooper '15, B.S. in civil engineering technology graduate and engineering technician for Murray Associates, Inc.

Jacob Rumski '14, B.S. in mechanical engineering technology graduate and junior estimator for Stevens Engineers & Constructors

GRADUATE OUTCOMES, INTERNSHIPS AND CAREER OPPORTUNITIES

Point Park's engineering technology graduates are prepared to enter professional careers, to pursue licensure as professional engineers and to enter graduate school in a variety of disciplines.

Graduates of the University's Master of Science in engineering management program are prepared to serve as managers, implementing and evaluating engineering projects as well as using financial principles to make decisions across various industries.

Point Park's engineering technology and engineering management students and alumni have landed a wide variety of internships and careers with regional, national and international companies and firms.

For example, students have completed internships with AllPoint Systems, Bayer Corporation, Continental Design and Management Group, GAI Consultants, Inc., Lechtzer Incorporated, Trinculo's Attic, U.S. Army Corps of Engineers, Westinghouse Electric Company and others.

Among the various companies Point Park's engineering technology and engineering management graduates have landed full-time positions with are Ansaldo STS, Body Media, Bridges and Company, Duquesne Light Company, Eaton Corporation, FedEx Ground, GAI Consulting, Industrial Scientific Corporation, Intertek USA, L.R. Kimball, Michael Baker Corporation, Murray Associates, Inc., PennDOT, Philips, Stevens Engineers & Constructors, Westinghouse Electric Company and more.

"I was very impressed with Point Park's high rate of job placement after graduation, for which I am very thankful for now," said Colston Cooper, who graduated from Point Park this past May with a B.S. in civil engineering technology.

Just days after graduation, Cooper was hired by the engineering firm Murray Associates, Inc., located in Pittsburgh's Turtle Creek Borough.

Read the success stories of Point Park University's engineering technology and engineering management graduates at www.PointPark.edu/EngineeringSuccessStories.

Brandy Miller '13, B.S. in civil engineering technology graduate and civil engineer trainee for PennDOT Engineering District 11

About the Author...

Amanda Dabbs, M.A. is the Web Content Editor in the School of Arts and Sciences and School of Business/ Office of Enrollment Marketing at Point Park University

Interweaving Practical Experience with Academia is Key to Future Engineers' Success

By Katie Spear

An advantage of an engineering education today is having the ability to combine practical real-world experience with academic learning. This can be accomplished through collegiate co-op and internship programs, which better prepare students for their future careers. While earning a college degree, students can gain valuable work experience, help earn money to pay for their college education, and better position themselves in finding a job after graduation.

Maureen Barcic, Co-op Director at the University of Pittsburgh, says that about 50% of students from Pitt's Swanson School of Engineering participate in co-op programs. One of these students, Paul Wozniak, is a co-op for the Joseph B. Fay, an i+iconUSA company.

Paul is now working his third co-op rotation at Fay. He went to Pitt after trying a few other career paths, including military service. While serving, he saw infrastructure that was crumbling, sometimes as a result of war efforts. His original intent was to pursue civil engineering so that he could go back to Africa to rebuild the infrastructure. While at Pitt, he learned of the specific construction management track in engineering and decided to pursue it. He now believes that his best opportunities lie in helping to rebuild the U.S. infrastructure, and he is already fulfilling that goal through his co-op program.

Paul's first rotation at Fay was on the Carrie Furnace Connector Road project, which involves building a brand new bridge to improve access to a planned development which includes housing, stores, and businesses. Paul learned about day to day operations on a construction site by interacting with the engineers, foremen, and superintendents working there. He also was exposed to the paperwork required to satisfy the needs of owners. Paul said that this experience gave him "rules of thumb" to better understand the materials presented in class and assured him that he was on the right career path.

Paul's second rotation was in estimating. He actually supported the Liberty Bridge project bid, which Fay won and is where Paul will be working on his current (3rd) rotation. For him, the most beneficial part of estimating was gaining experience in reviewing plans to learn the challenges involved in refurbishing bridges based on how they were originally built. When he returned to Pitt after that rotation, Paul had a class that required the use of the Steel Design Manual. He had an edge on his classmates, as he had used it for rolled steel shapes while working at Fay.

> *"Not only do students benefit from the practical experience, but they develop a sense of confidence in abilities, professionalism, and maturity"*

Describing his co-op experience, Paul commented, "Since I want to be in construction management, this experience has been invaluable. It gave me not only the experience to try out a career before my education was finished, but gave me the ability to learn about Fay. I had never heard of them before this and now I know that I fit their culture, like the people, and would like to work there when I graduate." Paul also commented that many students don't want to delay their graduation, which is common, particularly if you do three rotations of co-op. But he feels they should seriously consider it, as it gives them a chance to try out the field before getting a degree and change direction if they don't like it - and the sooner the better.

Barcic agrees, adding that after working in Pitt's co-op program for over 28 years, she can unequivocally state that practical training in the field is absolutely critical for undergraduates in engineering. Without such experience, the students don't realize the opportunities that await them. Not only do students benefit from the practical experience, but they develop a sense of confidence in abilities, professionalism, and maturity.

When hiring full-time graduates, companies look for students with experience. Barcic further commented, "Students not only enjoy their co-ops, but the companies allow them to contribute which helps the students recognize that they have a future in the company. That is a great partnership. We continually hear from our alumni, telling us that co-op is the best thing they did at Pitt."

About the Author...

Katie Spear is the Marketing Director of Infrastructure and Industrial Constructors USA, LLC (i+iconUSA), having been there since its inception. She has over 25 years of marketing experience including strategic planning, bid proposals, and social media. Katie is a member of Engineers' Society of Western PA (ESWP).

Engineering Education for the 21st Century

By Gerald D. Holder

Gerald D. Holder

This new academic year marks some significant milestones for the Swanson School of Engineering. The evolution of the Swanson School over the past two decades has been tremendous, and has resulted in growing national and international reputation for our programs, our research, and our faculty, students and alumni. As this fall edition suggests, engineering truly is a "lifetime of learning," and is reflected in how we as engineers impact our global society. I'd like to thank ESWP for allowing me to share how our programs continue to evolve at the Swanson School as we prepare the engineers of tomorrow.

BY THE NUMBERS

This is a record-setting year for enrollment at Pitt in general and the Swanson School in particular. Undergraduate enrollment has increased to nearly 3,000 students, including about 630 first-year students – our largest incoming class in history. And these students are exceptional – the average SAT score(math plus verbal) is just a couple points shy of 1400, and the average GPA is 4.2. Graduate enrollment has seen similar growth, to nearly 1,000 students, almost double what it was a decade ago.

As a result of this growth and an emphasis on faculty excellence, research productivity within the School has climbed as well, from $10.2 million in 1997-98 to $90 million when interdisciplinary research , mostly with faculty in the School of Medicine, is included. With national research leadership in Energy, Sustainability, Bioengineering and Nanotechnology, the Swanson School is now ranked among the top 25 public institutions in US News and World Report, and has greatly contributed to Pitt's national ranking among the top 10 American universities in terms of the federal research support competitively attracted by members of our faculty.

But numbers alone don't tell the entire story of our growth, or why a greater number of prospective engineering students from around the world seek to enroll at Pitt. Much of our academic success can be attributed to our continued focus on improving engineering education to both meet the demands of employers as well as produce a better engineer for tomorrow.

CHANGING THE CONVERSATION

The Swanson School of Engineering is proud of our experiential approach to engineering education, with our focus toward engaging students in innovation, entrepreneurship, research and practical experience. Ours was one of the first engineering programs in the country to recognize the increasingly international dimensions of engineering practice, and the need to educate graduates who can be competitive in a global marketplace.

One of the guiding principles of our curriculum and our communications is the 2008 NAE report, "Changing the Conversation: Messages for Improving Public Understanding of Engineering." Engineering education and pedagogy is rapidly evolving, and the classroom and lab of today are far different environments than you would have experienced even a few years ago. We often note that we are preparing many of our graduates for jobs that are yet to exist, but we cannot do so in a static environment.

Technology is pervasive and invasive especially for today's student, who is more familiar and comfortable with computer devices at a younger age.

Likewise, we also need to continually address the need for a better, more diverse and greater skilled cohort of future engineers. Engineering continues to play a critical role in our daily lives, but it is a profession that is independent of international borders and so our future engineers must be even more competitive than their counterparts.

Two ways that we're changing the way students engage in learning are by physically redesigning the classroom, and by figuratively "flipping" it. Benedum Hall, which is nearing the end of its eight-year, $100 million LEED Gold renovation, now features several smart classrooms to promote collaboration. Semi-circular desks seat eight students with four computer monitors each, so that students can work on problems together in a shared learning environment. The instructor can control the monitors from a central console and share his screen with the class.

"Flipping" the classroom is a relatively new environment that allows faculty to present lectures and assignments virtually, which students review at home. Then in class the students participate in activities that promote deeper learning through collaboration and application, rather than simply memorizing material and demonstrating understanding through quizzes and tests. Faculty who have participated in this model find that students who work together learn better, and can also support students who might not otherwise seek help outside the classroom.

Integral to these programs is a greater investment in technology throughout the curriculum. Technology is pervasive and invasive especially for today's student, who is more familiar and comfortable with computer devices at a younger age. By exploring and engaging in new technologies that can help us adapt the learning environment, we can better prepare students with a more enriching and engaging education.

OPPORTUNITIES ABROAD AND AT HOME

Because of the growing demand from employers that our students have a greater understanding of the global marketplace, international experience is now an important part of a Pitt engineering education. In fact, the Swanson School boasts one of the highest undergraduate participation rates in the U.S. Such skills enable Pitt graduates

to not only have a distinct employment advantage, but will also provide them with a cross-cultural awareness that will enhance their leadership abilities. Some of these opportunities include: Engineering the German Way in Munich; Global Supply Networks and Manufacturing Culture in Latin America (Uruguay); Engineering for a Better Environment: Brazil; and Engineering of the Renaissance: Florence, Italy.

Another international opportunity we're very excited about is the new Sichuan University – Pittsburgh Institute (SCPI), which was established two years ago and celebrated its first "matriculation ceremony" this September. As part of this agreement – one of only five between U.S. and Chinese universities – Sichuan University in Chengdu broke ground last summer for a 100,000-square-foot building that will house this joint engineering institute to educate undergraduate students and foster collaborative research. Sichuan University is the premier university in western China, located in Chengdu within the Sichuan Province, and it is consistently ranked among the top ten universities in China.

With emphases on advanced sustainable manufacturing and educational innovation, SCPI will initially offer three undergraduate degree programs: industrial engineering, mechanical engineering, and materials science and engineering. Students in the institute will be recruited from the United States, China, and possibly other countries, and the courses will be taught from Pitt's curriculum, in English. This is a unique opportunity for Pitt to expand its reach and for the Swanson School to provide not only a distinctive education to international students abroad, but also to give our own faculty and students the chance to participate.

In addition to international opportunities, we endeavor to provide the hands-on experience that employers desire in new hires through our cooperative education program. Pitt's co-op program, which is one of the oldest in the nation, is incredibly successful with students and employers. This year we expect to approach 1,000 participants, and are expanding our co-op sites across the country to accommodate demand. Co-op participants average a 96% retention rate to graduation and average almost $4,000 more in a starting salary than non-participants. Coursework and lectures are always important, but our students find that leaving the classroom and engaging in real-world engineering make them more competitive in the job market upon graduation.

Two ways that we're changing the way students engage in learning are by physically redesigning the classroom, and by figuratively "flipping" it.

Students at the University of Pittsburgh working in a collaborative environment

Also important is the integration of sustainability into our profession and our curriculum. Human society is facing new challenges from population growth, climate change, natural resources and more. If we are to create a better world for the generations to follow, engineers will have to come up with the answers. We can only do that by cultivating and educating students who can face those challenges head-on and create solutions as engineers have for generations.

On that note, Pitt declared the 2014-2015 academic year as the "Year of Sustainability," an opportunity to engage in a campus-wide conversation about how the academic, research, and social experience at Pitt can address issues related to sustainability. Our faculty, led by Eric Beckman, Director of the Mascaro Center for Sustainable Innovation with support from the Office of the Provost, truly took the lead in helping to change the conversation about how to integrate sustainability into the curriculum as well as to highlight the faculty and student research in these areas.

WHAT TOMORROW BRINGS

The future of engineering education at Pitt certainly is the most exciting it's been throughout my tenure. But its success is built upon a strong legacy and history. Spring 2016 will mark the 170th anniversary of Pitt Engineering – specifically, when the first two students graduated with engineering degrees (civil & mechanical) from Pitt. And 2017 marks the 150th anniversary of the founding of the Chair of Military Science and Civil Engineering at Pitt, the first dedicated engineering program.

Throughout that time, Pitt has educated some of the world's leading engineers, and produced groundbreaking research and innovation. Alumni proudly introduce themselves as "Pitt Engineers," signifying the lifetime of learning they continue to experience in their profession. The Swanson School of Engineering faculty and staff could not be more proud of all who have passed through our doors, including our nearly 25,000 living alumni. Hail to Pitt!

About the Author...

Gerald D. Holder is the U.S. Steel Dean of Engineering and Professor of Chemical Engineering at Pitt's Swanson School of Engineering. At Pitt, he has received awards for research and teaching, including the School of Engineering Award for Outstanding Research and the Board of Visitors Faculty Award.

In 2015 he was elected chair of the Engineering Deans Council Executive Board of the American Society for Engineering Education (ASEE) for a two-year term. The Engineering Deans Council (EDC) is the leadership organization of the Engineering Deans in the United States and has 344 members, representing over 90 percent of all US Engineering Deans.

Dean Holder earned a bachelor's degree in chemistry from Kalamazoo College, and bachelors,masters and doctoral degrees in chemical engineering from the University of Michigan.

ESWP Member News

More than 75 firms are represented in the Corporate Member program of the Engineers' Society of Western Pennsylvania (ESWP). Memberships are available at 3 levels: Gold, Silver and Bronze. Gold members are entitled to 14 memberships that can be exchanged by employees; Silver, 9; and Bronze, 5 — annual dues are $2400, $1700, and $1000 respectively. In addition, ESWP Corporate Member Firms may add 2 additional individuals in our Under-35 age category at no additional cost. More information can be found at eswp.com. Please contact the ESWP Office (412-261-0710) for additional details.

NEW! For Government Agencies, Corporate and Individual Memberships are available at a 50% discount!

Membership in ESWP comes with a long list of benefits! From our continuing education opportunities earning you Professional Development Hours (PDHs), to the business networking events in our fine dining city club, there is something for everyone in your organization. Also, ESWP is helping the next generation of engineers with student outreach programs, giving you the opportunity to participate in many rewarding programs.

ESWP Gold Corporate Member Firms

AECOM

gai consultants
transforming ideas into reality

MATRIX NAC

ARCADIS
Infrastructure · Water · Environment · Buildings

GATEWAY
On Call. On Time. On Target.

Orbital Engineering, Inc.

Michael Baker
INTERNATIONAL

HATCH™

HDR

PARSONS

CDM Smith

i+icon USA
Infrastructure & Industrial Constructors USA

USS

DEI
DeSalvo Enterprises, Inc.

ESWP Silver Corporate Member Firms

ALCOA

CEC
Civil & Environmental Consultants, Inc.

KU Resources, Inc.

PJ DICK
TRUMBULL
LINDY PAVING

amec foster wheeler

CSD
CARNEGIE STRATEGIC DESIGN
ENGINEERS
LLC

Est. 1985
Lennon, Smith, Souleret Engineering, Inc.
Civil Engineers and Surveyors

Uhde Corporation

ESWP Bronze Corporate Member Firms

Carnegie Mellon University's College of Engineering

By James H. Garrett, Jr.,

We did it!: Carnegie Mellon University College of Engineering Students celebrate their graduation.

Carnegie Mellon University's College of Engineering has distinguished itself among the nation's top engineering schools for its commitment to reaching beyond the boundaries of traditional disciplines in pursuit of innovation and solutions to real-world problems. It ranks sixth in the nation for undergraduate study and fourth for graduate, according to U.S. News and World Report. The university has many programs and events that contribute to student success by encouraging innovation, entrepreneurship, and a multidisciplinary and approach to problems in addition to providing students with technical excellence.

INNOVATION AND ENTREPRENEURSHIP

To foster, encourage, drive and manage innovation is a highly desirable skill set, particularly in the current global economy. It is in the College of Engineering's culture to challenge the norm — the College values entrepreneurship and creative thinking, so it offers opportunities for engineering students to develop those capabilities. It offers an accelerated master's program in Engineering and Technology Innovation Management, which equips students for meaningful careers as leaders in innovation and the strategic management of technology. The university also has, as part of the Carnegie Mellon|Portugal program, a dual Ph.D. program in Technological Change and Entrepreneurship.

During the College of Engineering's Impact-a-Thon, part of last October's Innovation Palooza event, groups of students put their technical and innovation skills to good use developing solutions to Pittsburgh's homelessness problem. Last year's forecasts of another particularly cold winter raised concerns about space in Pittsburgh's homeless shelters, which contain only 375 beds despite an estimated 1,500 homeless individuals in the city.

Student teams who participated in the competition were given five days to research the problem and come up with temporary and economically viable shelters that could be erected during cold weather. Each group approached the challenge in a unique way, with ideas that ranged from converting old public buses into portable homes to outdoor shelters that can be folded up and carried like a backpack during the day. Winners were awarded prize money that would allow them to bring their ideas to life.

A GLOBAL AND DIVERSE COLLEGE OF ENGINEERING

In addition to its focus on innovation and entrepreneurship, the College of Engineering is a global college, with almost 19% of engineering undergraduate students coming from outside of the U.S. It also has diversity in gender — roughly 30% of the undergraduate students in the College are female, much higher than the national average of about 20% as reported by the National Science Foundation. In some of the College's departments, almost half of the students enrolled are women.

Carnegie Mellon University
College of Engineering

The College of Engineering prepares undergraduate and graduate students to be leaders in multicultural and multidisciplinary environments. With affiliated research and educational programs in Greece, Japan and Portugal, the College presents many global opportunities. The Information and Communication Technologies Institute, part of the Carnegie Mellon|Portugal program, offers many graduate degree programs and dual Ph.D. programs, splitting student's time between Carnegie Mellon and a partnering Portuguese university.

Carnegie Mellon University senior Catherine "Kate" Groschner, a materials science and engineering major, took advantage of CMU's global outreach and was selected as one of 14 students nationwide to receive a Churchill Scholarship last January, which funds a year of postgraduate study at the University of Cambridge in England. Groschner is the 11th CMU student to receive the Churchill Scholarship, one of the most prestigious awards for studying abroad in the United Kingdom.

Carnegie Mellon University recently extended its global reach into Africa with its Center of Excellence in Information and Communication Technology. Focused on one of the fastest growing economic regions of the world, the Center of Excellence is creating a new generation of graduates able to take advantage of Africa's unique opportunities. Based in Rwanda, the Center of Excellence benefits from the country's bold ICT strategy and our own culture of innovation to provide a platform for students to become technology thought leaders in emerging markets. Two students in our Africa program, Ivy Wainain and Lynn Kirabo, were invited to the UN Women headquarters and received full tuition scholarships through the Government of Rwanda and UN Women.

In addition to our international programs, Carnegie Mellon University integrates the rich heritage and resources of the Pittsburgh campus with the opportunities available in the dynamic Silicon Valley business environment at our Silicon Valley campus. The university works with partners in the San Francisco Bay Area to establish a natural extension for the university's acclaimed graduate degree programs, innovative research and support for entrepreneurs. The campus offers degrees in Electrical and Computer Engineering and Integrated Innovation and Software Management.

HANDS-ON AND COLLABORATIVE, INTERDISCIPLINARY EXPERIENCE FOR STUDENTS

The College offers many programs that help students obtain real-world experience, such as the Real World Engineering program, which has shown students what engineering is like in industry and government. Currently running in Pittsburgh,

Washington, D.C. and Silicon Valley, the program gives undergraduate students the opportunity to network with professional engineers, shadow mentors, tour industries, connect with alumni and learn about future career opportunities.

Another event that allows students to get hands-on experience is Build18, which is hosted annually by the Department of Electrical and Computer Engineering's Student Advisory Committee at the beginning of the second semester. The event serves as an intellectual playground for the brightest and most creative of Carnegie Mellon's engineers. Over 200 Carnegie Mellon engineering students showcased their freestyle tinkering projects.

"It welcomes big ideas and trying new things, whether they work out or not, because they are an excellent way to learn something new," said Aaron Reyes, Build18 chair and ECE senior.

Some of the College's new specific programs include a focus on biomedical engineering, advanced manufacturing and nanotechnology. Thanks to a grant from the American Heart Association, the College began a program this May that trains undergraduate students to apply their biomedical engineering education to new technologies for clinical cardiovascular medicine.

And speaking of advanced manufacturing and nanotechnology, a transformative renovation of 40,000 square feet in Hamerschlag Hall will become a new MakerWing to integrate student-focused maker spaces, advanced manufacturing laboratories, collaborative research spaces and micro/nanosystems laboratories. It will become an epicenter of ideas turned real solutions in the education/research fusion that only Carnegie Mellon can deliver. Carnegie Mellon is one of three academic institutions that has both laser and electron beam powder bed 3-D metal printing capabilities, both of which students can use.

The College of Engineering encourages interdisciplinary studies through programs and initiatives such as the forthcoming Sherman and Joyce Bowie Scott Hall, a new LEED Gold building being erected on campus. Scott Hall will house the Scott Institute for Energy Innovation, the Department of Biomedical Engineering and the Disruptive Health Technologies Institute (DHTI), and it will be a major hub for nanotechnology research. Due to CMU's reputation for interdisciplinary work, the architectural plan is set up to encourage collaboration between the numerous disciplines that will coexist in the building. Open spaces and sitting areas encourage social interactions between researchers working in different fields, including the "collaboratory," a four-story space that connects all the levels of the North Wing.

Students from Innovation Palooza show off their project - flat when folded, but can be opened into a tent/sleeping bag. Insulated with Mylar, waterproof and ventilated, the addition of wool blankets keep occupants warm and comfortable.

"We need to educate students who can work collaboratively as part of a much more interdisciplinary team to solve the problems and challenges we face in all aspects of our lives," says James H. Garrett Jr., Dean of the College of Engineering. "This is something that we focus on in our engineering programs to create more holistic thinkers who will be capable of solving complex problems."

MechE 3d Printer: Mechanical Engineering students working with one of Carnegie Mellon University's 3D printer.

Just such a multidisciplinary student team won the DOE's National Clean Energy Business Plan Competition for Hyliion: a SMART Suspension System this year. Their add-on hybrid module for tractor-trailers captures otherwise wasted energy to reduce fuel consumption. The team was led by graduate student Thomas Healy.

Another collaborative team that distinguished itself this year was Carnegie Mellon's cybersecurity team, The Plaid Parliament of Pwning, who took second place at the DefCon Capture the Flag competition. The competition is widely considered the "World Series of Hacking."

"Every year this contest gets harder and harder," said David Brumley, the team's faculty adviser and the director of Carnegie Mellon's cybersecurity institute, CyLab. "It's amazing to see our team, year after year, put in long hours of preparation and compete with the best hackers in the world."

TECHNICAL EXCELLENCE

Carnegie Mellon University's College of Engineering is, at its heart, highly focused on research, offering students opportunities to work alongside highly-acclaimed faculty. Joshua Kubiak, an undergraduate research assistant in Materials Science and Engineering, distinguished himself by receiving the Barry M. Goldwater Scholarships, which encourages his pursuit of a research career in science and engineering. He is among 260 sophomores and juniors nationwide to receive this honor. Kubiak is working to improve methods of creating quantum dot backlights for more energy-efficient LCD screens for displays such as those on televisions or portable electronics. Incorporation of more efficient backlights can reduce energy consumption on a global scale while also increasing the battery life of portable devices.

"We aim to attract the best and brightest by igniting their hopes and dreams regarding a career in engineering with compelling stories such as self-driving cars, land, air and space robotics, new medical devices, new drugs, new materials and smart cities," says Garrett. "Our programs engage both the hearts and minds of bright, young people, as well as those further along in their engineering careers."

Stats, etc.

Our region is fortunate to have a high number of colleges and universities that offer ABET-accredited programs within easy driving distance in-and-around Western Pennsylvania. The following is a listing of such institutions of higher learning, and the programs offered, that are located within a 200-mile radius of ESWP. This list contains only undergraduate programs. For information on other degree programs, visit abet.org.

School Name	Location	Miles from ESWP	Website	Program and Degree Name
Point Park University	Pittsburgh, PA	0	www.pointpark.edu	Civil Engineering Technology, Electrical Engineering Technology, Mechanical Engineering Technology, BS
University of Pittsburgh	Pittsburgh, PA	3	www.pitt.edu	Bioengineering, Chemical, Civil, Computer, Electrical, Engineering Physics, Industrial, Materials Science and Engineering, Mechanical, BS
Carnegie Mellon University	Pittsburgh, PA	4	www.cmu.edu	Chemical, Civil, Electrical and Computer Engineering, Engineering and Public Policy, Materials Science and Engineering, Mechanical, BS
Robert Morris University	Moon Township, PA	17	www.rmu.edu	Computer Information Systems, Information Sciences, Manufacturing Engineering BS
Pennsylvania State University, New Kensington Campus	Upper Burrell, PA	26	www.nk.psu.edu	Electro-Mechanical Engineering Technology, BS
California University of Pennsylvania	California, PA	36	www.calu.edu	Computer Engineering Technology, Computer Information Systems, Computer Science, Electrical Engineering Technology, BS
Geneva College	Beaver Falls, PA	41	www.geneva.edu	Computer Science, Engineering, BSE
Slippery Rock University	Slippery Rock, PA	51	www.sru.edu	Computer Science, Information Systems, Information Technology, BS
Indiana University of Pennsylvania	Indiana, PA	57	www.iup.edu	Computer Science Languages and Systems Track, Safety Sciences, B.S.
Grove City College	Grove City, PA	58	www.gcc.edu	Electrical Engineering, BSEE; Mechanical Engineering, BSME
Youngstown State University	Youngstown, OH	66	www.ysu.edu	Chemical Engineering, BE; Civil and Construction Engineering Technology, BSAS; Civil and Construction Engineering Technology, BSAS; Civil Engineering, BE; Electrical Engineering Technology, BSAS; Electrical Engineering, BE; Industrial and Systems Engineering, BE; Mechanical Engineering Technology, BSAS; Mechanical Engineering, BE
University of Pittsburgh at Johnstown	Johnstown, PA	67	www.pitt.edu/~upjweb	Civil Engineering Technology, BS Electrical Engineering Technology, BS, Mechanical Engineering Technology, BS
West Virginia University	Morgantown, WV	76	www.wvu.edu	Aerospace, Chemical, Civil, Computer, Computer Science, Electrical Engineering, Industrial, Mechanical, Mining, Petroleum and Natural Gas Engineering, BS
Saint Francis University	Loretto, PA	80	www.francis.edu	Environmental Engineering, B.S.
Fairmont State University	Fairmont, WV	91	www.fairmontstate.edu	Civil Engineering Technology, BSET; Electronic(s) Engineering Technology, BSET; Mechanical Engineering Technology, BSET; Occupational Safety, BS
Pennsylvania State University, Altoona Campus	Altoona, PA	98	www.altoona.psu.edu	Electro-Mechanical Engineering Technology, BS
Edinboro University of Pennsylvania	Edinboro, PA	110	www.edinboro.edu	Computer Science - Theoretical, BS
The University of Akron	Akron, OH	110	www.uakron.edu	Biomedical, Chemical, Civil, Computer, Electrical, Mechanical, Mechanical-Polymer Engineering, BS

School Name	Location	Miles from ESWP	Website	Program and Degree Name
The University of Akron - Summit College	Akron, OH	110	www.uakron.edu	Construction Engineering Technology, Electronic Engineering Technology, Mechanical Engineering Technology, Surveying and Mapping, BS
Muskingum University	New Concord, OH	117	www.muskingum.edu	Engineering Science, BS
Gannon University	Erie, PA	127	www.gannon.edu	Computer Science, Electrical, Environmental, Information Systems, Mechanical, Software, BS
Pennsylvania State University, Behrend College	Erie, PA	127	http:psbehrend.psu.edu	Computer Engineering, BS; Electrical and Computer Engineering Technology, B.S.; Electrical, Mechanical Engineering Technology, Mechanical, Plastics Engineering Technology, Software, BS
Case Western Reserve University	Cleveland, OH	128	www.case.edu	Aerospace, Biomedical, Chemical, Civil, Computer, Computer Science, Electrical, Engineering Physics, Materials Science and Engineering, Mechanical, Polymer Science and Engineering, Systems and Control Engineering, BS
Cleveland State University	Cleveland, OH	132	www.csuohio.edu/engineering	Chemical, Civil, Computer, Electrical, Electronics Mechanical Engineering, BS; Engineering Technology, BSEET,
Pennsylvania State University	University Park, PA	136	www.psu.edu	Aerospace, Bioengineering, Biological, Chemical, Civil, Computer, Electrical, Energy, Engineering Science, Environmental Systems, Industrial, Materials Science and Engineering, Mechanical, Mining, Nuclear, Petroleum and Natural Gas Engineering, BS; Architectural Engineering, B.A.E.
Marietta College	Marietta, OH	154	www.marietta.edu	Petroleum Engineering, BS
Shippensburg University	Shippensburg, PA,	171	www.ship.edu	Computer Science, BS
The Ohio State University	Columbus, OH	183	www.osu.edu	Aeronautical and Astronautical Engineering, BSAAE; Agricultural Engineering, BSFABE; Biomedical Engineering, BSBME; Chemical Engineering, BSChE; Civil Engineering, BSCE; Computer Engineering, BSECE; Computer Science and Engineering, BSCSE; Electrical Engineering, BSECE; Environmental Engineering, BSEnvE; Food, Biological, and Ecological Engineering, BSFABE; Industrial and Systems Engineering, BSIE; Materials Science and Engineering, BSMSE; Mechanical Engineering, BSME; Welding Engineering, BSWE
Messiah College	Grantham, PA	199	www.messiah.edu/hub.htm	Engineering with 6 different concentrations available, BSE
Pennsylvania College of Technology	Williamsport, PA	199	www.pct.edu	Civil Engineering Technology, BS; Plastics and Polymer Engineering Technology, BS
Ohio University	Athens, OH	200	www.ohiou.edu	Aviation, Chemical, Civil, Computer Science, Electrical, Energy, Engineering Management + Technology, Industrial + Systems Engineering, Mechanical, Technical Operations Management, BS
Bucknell University	Lewisburg, PA	200	www.bucknell.edu	Biomedical, Chemical, Civil, Computer Science and Engineering, Computer Science, Electrical, Mechanical, BS

source: http://www.abet.org/accreditation/

Stats, etc.

The intensity of Science & Engineering (S&E) employment—the proportion of workers in a state employed in S&E jobs—is a measure of the regional concentration of S&E jobs. At the state level, S&E employment intensity was highest in the District of Columbia, followed by Maryland and then by the four states: Massachusetts, Virginia, Colorado, and Washington (table 1). The three most populous states—California, Texas, and New York—despite accounting for one in four S&E workers in the nation, had lower shares of their employed population in S&E occupations. Most states had a lower S&E employment intensity than the United States as a whole.

Rank	State	Science & Engineering employment	Science & Engineering employment intensity[1]
1	California	786,653	4.9
2	Texas	450,316	4.0
3	New York	328,851	3.6
4	Florida	235,054	3.0
5	Virginia	234,067	6.2
6	Pennsylvania	224,196	3.9
7	Illinois	215,554	3.7
8	Massachusetts	209,321	6.4
9	Ohio	193,623	3.8
10	Washington	187,362	6.1
11	New Jersey	182,146	4.8
12	Maryland	180,415	7.0
13	Michigan	172,831	4.3
14	Georgia	158,666	3.8
15	North Carolina	154,387	3.7
16	Colorado	149,632	6.1
17	Minnesota	125,757	4.6
18	Arizona	105,066	4.0
19	Wisconsin	100,219	3.7
20	Missouri	96,563	3.5
21	District of Columbia	85,624	10.7

[1] Intensity of S&E employment in a state is defined as the percentage of all workers in that state employed in S&E occupations.

SOURCE: U.S. Census Bureau, American Community Survey

Stats, etc.

The Career Path for Engineering Graduates

By Zach Huth

It seems these days manufacturing, construction and other specialized service employers prefer their employees in product/service design, and those heavily involved with customer management to possess an engineering degree. Whether its sales, project management, or quality control, it seems as if companies are applying engineering to every aspect of their business. Even the medical, legal, and financial worlds are employing engineers to implement manufacturing and industrial engineering principles in order to stream line billings, patient care, and customer service. According to the U.S. Bureau of Labor statistics the field of engineering is expected to grow by 10 percent in the coming decade. In recent years, the prospects for college graduates have been fair at best, but engineering graduates experience a much more favorable job market. Currently, within 100 miles of Pittsburgh, employers have the need to fill over 3,000 positions of varying levels of experience, and all these positions are requiring an engineering degree. Experts say demand for engineers will continue to grow as governments and industry work to meet the challenges of a growing global population and dwindling resources; not to mention an aging workforce. From an income standpoint, those possessing an engineering degree will statistically earn a higher salary than those with liberal arts degrees. In 2012, the Boston Globe reported, over the course of a lifetime, engineering majors will earn $1.4 million more than liberal arts majors.

In 2014 in our region, the Bureau of Labor Statistics reports there are between 450 and 6,780 engineers employed in this area.

OCCUPATION	ANNUAL MEAN WAGE
Architecture and Engineering Occupations	$75,300
Architects, Except Landscape and Naval	$91,550
Landscape Architects	$56,980
Cartographers and Photogrammetrists	$52,890
Surveyors	$55,940
Aerospace Engineers	$85,180
Biomedical Engineers	$69,130
Chemical Engineers	$96,260
Civil Engineers	$81,840
Computer Hardware Engineers	$83,600
Electrical Engineers	$87,670
Electronics Engineers, Except Computer	$78,890
Environmental Engineers	$83,620
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	$74,740
Industrial Engineers	$85,720
Materials Engineers	$80,990
Mechanical Engineers	$89,100

OCCUPATION	ANNUAL MEAN WAGE
Mining and Geological Engineers, Including Mining Safety Engineers	$90,250
Nuclear Engineers	$89,320
Petroleum Engineers	$120,200
Engineers, All Other	$97,270
Architectural and Civil Drafters	$51,020
Electrical and Electronics Drafters	$58,860
Mechanical Drafters	$49,560
Drafters, All Other	$53,790
Civil Engineering Technicians	$49,370
Electrical and Electronics Engineering Technicians	$52,490
Electro-Mechanical Technicians	$47,870
Environmental Engineering Technicians	$44,990
Industrial Engineering Technicians	$51,450
Mechanical Engineering Technicians	$50,750
Engineering Technicians, Except Drafters, All Other	$52,970
Surveying and Mapping Technicians	$43,010

Source: http://www.bls.gov/oes/current/oes_38300.htm#17-0000

Stats, etc.

"Engineering" a High School Renovation Project

By Ron Davis

Dr. Ron Davis

Project/problem-based learning: Problem-solving; data analysis; collaboration; teamwork; innovation; creativity; utilization of technology as a tool; and application of academic principles. This framework for learning transcends the academic K-12 landscape, post-secondary education, and various professions including the practice of engineering. At each level of a person's education and/or career, these types of transferrable skills allow an individual to find success in the 21st century workforce. Mt. Lebanon High School, a suburban high school of approximately 1800 students in Pittsburgh, Pennsylvania, has prided itself on this learning principle as one mechanism to maintain the rich, long-standing traditions of academic excellence for which the school is known.

An opportunity presented itself for the Mt. Lebanon School District in the mid to late 2000s to re-imagine the teaching and learning spaces available to students, and the respective spaces' position to one another, as the District embarked on a high school construction/renovation process. Just as the concept of "design" is important to engineers, design of the high school was important to the Mt. Lebanon students, teachers, administrators, parents and community as this project provided the opportunity to solve a number of issues that had been prevalent in the building's functionality. Issues included items such as variable temperatures throughout buildings and classrooms, deteriorating pipes, maxed electrical capacities, and an aging building envelope that created a number of issues in its own right. Various constituents groups identified a number of design criteria to be considered throughout the process, and one in particular was to "meet MTLSD educational goals for 21st century learning". The community reinforced that the facility's design had to support and advance the curriculum which, in part, was teaching the transferable skills needed by a 21st century learner. Understanding community expectations, collaboration with the faculty, administration, and support staff about the classroom, office, and auxiliary space designs and locations was commonplace during the design process. After considering a number of conceptual design iterations, the final decision was to proceed with a hybrid of new construction and renovation of existing spaces.

At times one hears of organizations that become "information rich and analysis poor" because the individuals involved with data become paralyzed by the sheer amount data and the myriad of considerations required because of the data. The collaborative nature during the Mt. Lebanon High School design process provided

Rendering of re-designed Mt. Lebanon High School

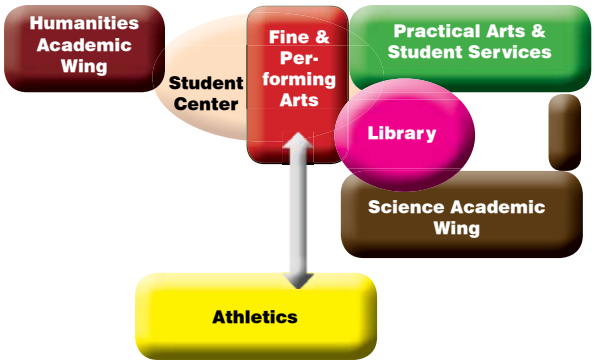
many ideas and much information that needed to be analyzed, but "data analysis paralysis" did not result. Information was used purposefully while engaging the project's constituents. Series upon series of meetings with various stakeholders vested in the outcome of the project, both internal and external to the school district, resulted in refinements to the design and construction drawings and documents, allowing for a product to be developed for which the community could be proud. The driving cultural value within the Mt. Lebanon School District of continuous improvement was evident during the design process; those involved realized the importance of their role in analyzing the data and issues, providing feedback, and reviewing design proposals so that the future high school building was positioned to provide a high quality educational experience for students well into the future.

There was analysis, by academic department, to ensure that the appropriate number and size of teaching spaces were being considered to allow for the implementation of the curriculum as it existed and was being imagined for the future. There was analysis as to where the respective academic departments should be positioned in the scheme of the building to allow for interdepartmental collaboration. There was analysis as to the infrastructure, heating and cooling, that should be planned to allow for the facility to be used in the most cost efficient and effective manner. There was analysis as to the electrical and technology underpinnings that should be planned to allow for any classroom in the school to act as a computer lab, to accommodate the vast amounts of data transmissions to and from the students and staff, and to operate a state-of-the-art security system. Along these same lines, there was analysis as to how to design flexible spaces with flexible technology infrastructures to allow for the school to evolve as times and technology offerings change. There was even analysis about climatic issues, temperature trends, wind patterns and natural lighting to determine the impact natural resources would have on the facility. Information was used purposefully to design the new building(s).

Engineers specialize in a discipline to practice their craft. This notion of specialization, as it relates to the delivery of the curriculum, was considered during the design process for Mt. Lebanon High School. Allowing teachers to collaborate and deliver instruction in mutually beneficial spaces, while showing the interrelations of the curriculum as it relates to a career, enhances the students' overall learning experience. Curricular interdepartmental connections, then, influenced the placement of spaces in relation to one another in the building's footprint. One such example is the Mt. Lebanon High School STEM (Science, Technology, Engineering, Math) Academy.

The Mt. Lebanon High School STEM Academy provides students an opportunity to research, through academic pursuits and experiential learning, a potential

future career interest. The Mt. Lebanon High School STEM Academy introduces students to the vast opportunities available in the field of engineering, as an example, through a program of curricular emphasis on Technology, Engineering, and Math. Participation in the STEM Academy provides students with a foundation of knowledge and technically oriented experiences in the study of the applications of engineering and its effect upon our lives and the choosing of an occupation. Participation in the STEM Academy complements a student's pursuit of mastering the Pennsylvania Academic Standards in a broad array of course offerings, as required by the Pennsylvania Department of Education. In addition, the unique, flexible nature of the STEM Academy allows students to select elective course offerings that meet their individual interests. The STEM Academy focuses on transferable skills through participation in a variety of school and community-based programs, as well as through the completion of a senior externship.



Bubble diagram illustrating the conceptual layout of Mt. Lebanon High School

High School Technology Education teacher, Andrew Kuskil, comments in a recent newspaper article about the STEM Academy, "The proximity of all the STEM-related classrooms and labs to one another helps teachers to collaborate more, even if it's just informal meetings in the halls, and allows students to shuffle between classrooms on cooperative projects". Practical Arts, which includes Technology Education, Business Information & Technology, Television Production, are strategically located in proximity to science and math. And although the STEM Academy is referred to as STEM, the student experience is really a "STEAM" experience, as the "Arts" are integral to and integrated in the students experience at Mt. Lebanon High School. Additionally, considerations were made during the design process that informal learning spaces need to be included in the building to support the formal learning spaces. The combination of formal and informal learning spaces were strategically planned to offer the students the best educational experience possible.

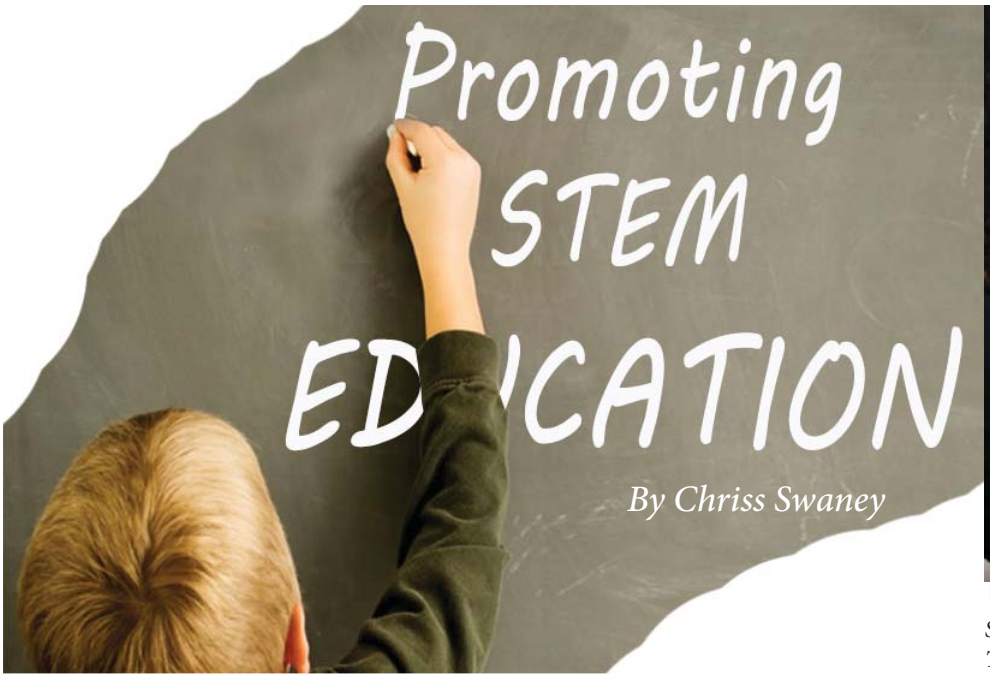
Mt. Lebanon High School's STEM Academy prides itself in that the facility does not offer the curriculum a stand alone "maker space"; the entire facility is dedicated to the approach of students actively developing academic knowledge and 21st century skills by engaging in their learning process. The facility complements the curriculum by offering the students a "maker experience. Students collaborate using the academic principles being studied to design and test solutions to real-world problems. The proximity and interrelation of the spaces allow the teachers to provide the students with an experience that transcends learning between the academic disciplines in a meaningful way.

About the Author...

Dr. Ron Davis serves as the Assistant Superintendent of Secondary Education for the Mt. Lebanon School District in suburban Pittsburgh, Pennsylvania. The Mt. Lebanon School District is recognized nationally for high academic performance, educational innovation, and operational ingenuity. Prior to his appointment to this position in 2011, he served as the High School Principal for this same high performing school district. Before returning to his hometown of Pittsburgh, PA in 2007, Dr. Davis was the Principal of a middle/high school complex in Southern New Jersey. While there, his school was named a "Benchmark School for the State of New Jersey" on two separate occasions. And to start his career, Dr. Davis taught, coached and served as an athletic director at a large urban high school in South Florida.

Dr. Davis received his Bachelor of Science degree in Secondary Education (Social Studies) and a Master of Arts degree in Counseling and Educational Psychology from Slippery Rock University of Pennsylvania. In 1999, his doctoral degree in Education Leadership was confirmed from Nova Southeastern University with a dissertation entitled, "Coaching the Coaches: Induction using Technology".

Dr. Davis has taught courses for the University of Phoenix Online in its Masters of Education program since 2000, as well as served as a Faculty Supervisor for aspiring student teachers. He has taught for and served as a mentor for aspiring principals in the University of Pennsylvania's Educational Leadership Program for Aspiring Principals. Dr. Davis has and continues to serve as a Chair for validation team for schools seeking accreditation from the Middle States Association of Colleges and Secondary Schools. He has been a speaker at numerous local, state and national conferences and has published a number of articles, including the lead chapter in Success Simplified, entitled Building Leadership Capacity: Individuals, Teams, and Organizations.



Promoting STEM EDUCATION

By Chriss Swaney

Sci-Tech Students Aaliyah McBride (Left) and Taylor Walker

Dream. Discover. Design.

That's the mantra of Pittsburgh Science & Technology Academy in Oakland, a public magnet school focused on the STEM fields: science, technology, engineering and mathematics.

Essentially, the entire middle and high school shines a spotlight on innovation.

"The whole idea is to inspire our students through research projects and by creating an environment of discovery and creativity," according to Edwina Kinchington, high school science chair and instructional teacher at the Pittsburgh Science & Technology Academy.

Kinchington said that as part of the school's curriculum, each student chooses one of four different concentrations at the end of their ninth grade year: Form and Function, Computer and Connections, Environment and Energy and Body and Behavior.

"A major goal for me is to create opportunities for students in and outside of the classroom", said Kinchington, the 2015 recipient of the Pennsylvania Outstanding biology Teacher Award. "We want our students to realize that just about everything in our daily lives has been touched at some point by the work of scientists and engineers," she said.

But like most STEM instructors, Kinchington worries about the lack of women in STEM fields and wants to boost their involvement. "I loved math and science but that is not always true for everyone," she said.

Today, females represent 60 percent of the nation's college population yet less than one –third major in STEM. They often have the ability but lack the interest.

"What we have done at our school is established a STEM culture that supports STEM learning. It's not unusual for Sci-Tech students to dabble in everything from evaluating the results of an experiment with simulated antigens, such as bacteria and viruses, and the antibodies, the proteins in your body that helps fight antigens to using a Mac-based GarageBand app to make a melody in music class.

"I grew up in New York state and it was so competitive, and I want my students to be able to compete comfortably" said Kinchington. And competitive they are.

> *"We want our students to realize that just about everything in our daily lives has been touched at some point by the work of scientists and engineers."*

According to last year's Keystone exam data, nearly three-quarters of high schoolers in SciTech achieved proficiency in algebra by the end of their junior year, and more than 80% were proficient in literature. That's compared to a district-wide average of 51% in algebra and 64% in literature.

"We always strive for the best when it comes to our students," she said.

Kinchington serves as an advisor to the University of Pittsburgh Cancer Institute Scholars program in addition to collaborating with principles at Pitt and Carnegie Mellon University to provide research opportunities to her students. She has also been a participant in the International Society for Technology in Education and the National Math and Science Initiative.

By Jen Stancil

This year, the spring session of *Design Lives Here* included seven returning schools from previous years with the addition of three new participating schools. Approximately 240 students in grades 5-8 represented these different South-West PA educational stakeholders in preparation for the culminating competition on May 1st at Inventionland. Design Lives Here is presented by WQED in partnership with the Engineers' Society of Western Pennsylvania (ESWP) and Inventionland. Over the last five years, WQED and ESWP has engaged more than 2,300 middle school students through its *Design Lives Here* program aimed at encouraging area kids to learn more about and consider a profession in engineering. Participating educators and students utilized STEM activities and content from *Design Squad Nation* episodes and interactive resources, with support from local engineers, to learn about the engineering design process and complete a number of engineering challenges throughout the spring semester.

The spring session participants convened on Friday, May 1st for "Invention Convention", a day-long competition event that included three hands-on/minds-on engineering challenge activities and the opportunity to speak with the engineering mentors and staff. Students were grouped into teams across schools, giving an opportunity to work in new teams. Teams were then given challenges such as "Zip Line," where they were challenged to design and build a transport carrier that can carry a "passenger" Ping-Pong ball from top to bottom in four seconds or less using a limited supply of materials.

The challenge activities are supported by local engineering mentors, giving students and teachers the opportunity to interact with professional engineers throughout the day. In addition to the on-site engineering challenges, students complete one final challenge – the Invention Challenge. Prior to attending Invention Convention, students identified a problem in one of eight categories (kitchen/culinary, outdoors, pets, sports/hobbies, toys (non-electronic), vehicles (transportation), wearables/fashion and miscellaneous). Students were then challenged to invent a solution to that problem, and illustrate or build a specialized model (prototype) of their invention. Students then "pitched" their ideas and products to the professional inventors at Inventionland, where they received feedback and coaching regarding those creative designs.

Participating schools include:

- Environmental Charter School
- Franklin Regional Middle School
- Gateway Middle School
- Haine Middle School, Seneca Valley School District
- Independence Middle School, Bethel Park School District
- Marshall Middle School, North Allegheny School District
- Mother of Sorrows School (MOSS)
- St. Philip School
- West Mifflin Middle School
- Winchester Thurston School

Design Lives Here is a student outreach program based on the PBS show Design Squad Nation, a reality-style program created to "inspire the next generation of engineers." The show features teens engaged in challenges all over the United States and globe, vying for scholarships by designing devices to understand the complex – and compelling – world of engineering.

Pitt Formula SAE

By Emily Anthony

The University of Pittsburgh Formula SAE team is a group of about 30 engineering and business students who design, build, and race open-wheeled, formula-style race vehicles. Panther Racing is structured on two backbones: technical and business. The technical team manages all design and fabrication of the vehicle. Each component is carefully modeled, analyzed, and manufactured by engineering students. The team works closely with companies like TechShop to produce components that they are unable to make in-house. The business team manages the team's budget, sponsorships, media, and events.

THE PROGRAM

Through the FSAE program, students learn a variety of skills that are not learned in a classroom. Students participate in the program voluntarily – no credit is earned and it is not a required part of any curriculum. The students involved are there purely because of their passion for learning and their drive to succeed.

Students learn CAD skills as well as the engineering design process before they learn it in the classroom. Material selection, FEA, and designing for fabrication are all emphasized for each component of the car. In the manufacturing stage, students learn how to safely weld, use manual machines, 3D print, create carbon fiber pieces, and even CNC machine to produce the components they designed.

Nothing is more rewarding than seeing one's CAD model come to life in the shop.

Additionally, students have the opportunity to learn about wiring and sensor calibration, data acquisition, and troubleshooting. Using techniques taught in lab courses, students can identify and diagnose problems, optimize the vehicle performance using sensor data, and tune the car to its full potential.

To complement learned engineering concepts, students also learn budgeting and sales skills. Using communications and financing strategies learned in class, the team learns to present themselves, the organization, and the vehicle effectively and professionally.

THE COMPETITION

The concept of the competition is that a manufacturing company has contracted each team to develop a racing prototype. That prototype is presented to the company in a series of events. The prototype and the team are evaluated on the quality of design and manufacturing, the ability to budget for and sell the prototype, and its ability to outperform other vehicles on track.

At competition, the students must complete a variety of events. They are split between static and dynamic: design, sales presentation, and cost, then acceleration, skidpad, autocross, and endurance, respectively.

The engineering design event is an evaluation of each prototype's design. Design judges - representatives from automotive, aerospace, and race technology companies - discuss design decisions with students and evaluate their design and presentation skills. The top 10 teams are selected and further evaluated in design finals; Panther Racing placed 7th in engineering design in May 2015!

Cost and sales presentation evaluate the financials and the sales ability of the team. A full cost report that describes the costs of mass production of the vehicle is created by each team. They are scored based on their overall vehicle price, the quality of the cost report, and their response to manufacturability and cost efficiency. The goal of the sales presentation is to receive funding from mock investors; students are scored based on their public speaking ability, financial feasibility, and sales approach.

The entire competition is a build up to the final event on Saturday: the endurance event. 22km of racing with 3-5 other teams at a time results in a day of high stress and even higher excitement. The event consists of 2 drivers traveling 11km each. During this time, there are no pit stops – if the car goes down, the team is finished. The team is scored based on fuel efficiency and finishing time.

In the 2015 competition season, the team attended 3 events: FSAE Michigan, FS Germany, and FS Austria. In Michigan, Pitt FSAE placed 34/120 overall, with a top 10 finish in Design and top 15 finish in Skidpad and Acceleration.

The Formula SAE program is the most beneficial organization that engineering students can participate in during their time at the University of Pittsburgh. Through the emphasis of teamwork, budgeting and financing a large scale project, and balancing school work and the team, Pitt FSAE grooms its students to become successful engineers when they graduate.

Want to support Pitt FSAE? Contact the team at pittfsae@gmail.com regarding sponsorship or find the team on Facebook at www.facebook.com/PittFSAE and Twitter/ Instagram @PittFSAE.

From left to right: Emily Anthony, John Conturo, Andrew Lawniczak, Shroy Mukerjee, Nick Hills, University of Pittsburgh Chancellor Patrick Gallagher

Energizing Zimbabwe

By Allison Fisher

This summer, three students and two mentors from Carnegie Mellon Universiy's Engineers Without Borders Chapter (EWB) travelled to Nyadire, Zimbabwe on an assessment trip for our new project: Nyadire Street Lighting. The students were Kavin Sanghavi (Project Lead, junior Civil and Environmental Engineering), Maddie Gioffre (MSIT), and Allison Fisher (junior Computer Science, Engineering and Public Policy minor). The mentors were Matt Bovee (EIS Solar), and Drew Harvey (The Nyadire Connection). Nyadire, Zimbabwe is located three hours Northeast of Harare, in the Mashonaland East Province The community is a Methodist mission complex and is home to about 3,000 people. Nyadire contains a hospital that serves the northeast region of Zimbabwe, as well as a primary school, high school, teacher's college, and church. CMU EWB became involved in Nyadire to help address challenges that come from lack of electricity, since the national grid power supply is inconsistent and projected to get worse in the coming years. The Nyadire Street Lighting project aims to increase the safety and productivity of community members after sunset, by lighting common outdoor pathways independently from the grid power supply.

On the assessment trip, our team met with community stakeholders to formally identify the project, quantified the current grid power supply, collected data to assess feasibility of alternative energy sources, and mapped out and prioritized where to install street lights. The team also travelled to several rural health clinics and other locations to learn how lack of power affected operations in more remote settings. The team plans to carry out an alternatives analysis during the Fall 2015 semester to identify the most cost-effective and sustainable alternative energy source to power the street lights. Currently, the options under consideration include solar, hydropower, biogas, and grid-charged batteries. Then, design work will be done in the spring 2016 semester, with the goal of traveling for implementation in August or December 2016.

Like most EWB activities, EWB relies heavily on donations and fnundraising to support our efforts. If interested, visit https://takeaction.ewb-usa.org/carnegie-mellon-university-chapter to help us reach those goals. Additional information on our chapter and other projects can be found on our website cmuewb.org

ACE MENTOR PROGRAM
ARCHITECTURE · CONSTRUCTION · ENGINEERING

A NEW ACE YEAR KICKS OFF

By Jon O'Brien

The 2015/2016 ACE Mentor Program of Western Pennsylvania kicks off in October. Each year with ACE there is a theme and each of the mentoring session work on completing a project within the theme. This year the theme is community and recreation. The program will trace the real life steps needed to construct a project under this market type. From the design through construction closeout, the participating high school students will get an actual feel for what it takes to build a project for Camp Guyasuta, a Boy Scouts of America owned site in the Laurel Highlands.

ACE, which stands for Architecture, Construction & Engineering, is a program geared towards preparing high schools students into a profession in an ACE discipline. The Western Pennsylvania chapter is embarking on its ninth year. Despite being one of the younger ACE chapters in existence, this ACE chapter is able to succeed annually due to a strong supportive system from the region's construction community.

The local community shows it support by providing the educational sessions held from October through April. Students partake in sessions that focus on: site and project planning; water resource engineering; civil engineering; structural engineering; architectural design; plumbing engineering; solar engineering; and, landscape design. Additionally, the students get a hands-on education from two building tours; a building trade session at the Carpenters Union; and they witness a contractor on bid day.

The ACE program is successful due to the dozens of mentors that volunteer their time and expertise. It is extremely difficult to run programming on every two weeks eight months, but ACE is able to do it because of the young professional industry leaders that get involved and their mentor co-chairs Anastasia Herk and Bethany Yoder. Their passion and devotion for this program is contagious and is passed on throughout the ranks of the mentors.

If you would like to assist with ACE, there are numerous opportunities this upcoming year to learn firsthand about the program and meet fellow mentors. This fall there is a session to introduce the program to the high school students and their parents, and it is well attended by industry professionals. During this event the program is explained and the theme of the year is described.

In April there is a mentor appreciation night in which the industry gathers at a reception to thank the dozens of mentors. In May there are two opportunities in back-to-back weeks to show your support for Ace. On Wednesday May 11, the Carpenters Union host the ACE Year-end Student Presentation. At this event the high school student teams provide presentations on their project that they have been working on all year. These presentations are given in front of the mentors, their parents and the industry at large. It's always a great turnout and an excellent way to see the future industry minds in action. Then on May 18, the industry gathers for Celebrate ACE. At this formal event the successes of the ACE year are recognized and the year's ACE scholarship winners are announced. Hundreds gather for this much anticipated industry event.

As indicated there are numerous opportunities to learn and become part of the ACE community. The best way to stay informed of the ACE Mentor Program of Western PA is to join the ACE email list. To add yourself to the list, please send an email to jobrien@mbawpa.org.

About the author...

Jon O'Brien is the Director of Industry Relations for the Master Builders' Association and he is on the Board of the ACE Mentor Program of Western PA, serving as the Communications Director. He can be reached at jobrien@mbawpa.org and 412-922-3912.

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