Taryn Melkus Bayles has been a bundle of energy since birth. Just listening to her plans for promoting the success of young engineers is exhausting, let alone trying to keep up with her. I’m fortunate to have known Taryn since grad school and have had the privilege of having her as a friend and colleague. She is a kind, thoughtful, compassionate, loyal friend, a caring Christian, and a brilliant educator. Taryn has impacted thousands of young engineers during her highly successful career. Here, we share with you a behind-the-scenes look at the experiences that forge such an exceptional teacher and role model.

Taryn was born in Dayton, Ohio. When she was a few weeks old, her father was relocated to Holloman Air Force Base in New Mexico where he worked as an Aerospace Engineer. Dr. Harald Melkus was remarkable. Born in Kiev and educated in Russia, he was captured by the Germans during WWII to work for Dr. Wernher von Braun’s team in Peenemunde, Germany. While in Germany, he studied under Hermann Schlichting of “Boundary Layer Theory” fame - an association that Taryn didn’t make until she was in graduate school. He then became an “Operation Paperclip” scientist - a program that brought scientists and engineers from Germany to the US after WWII.

In her early years, Taryn loved serving as Harald’s apprentice for simple repairs around the house. Unbeknownst to young Taryn, it was in these moments that her father was lovingly planting the seeds of “hands on” education in her that would later become the hallmark of her career as an engineering educator. Taryn fondly remembers working alongside her dad as they fixed cars, washers, built furniture, sewed, and re-tarred roofs. She shadowed him constantly and loved every minute of it, treasuring their time together. Sadly, a fatal heart attack took her father’s life when Taryn was only 12 years old.

Taryn’s mother, Gisela Melkus, was an adventurous, charming, out-going woman who was fluent in four languages, visited over 100 countries, and lived to be over 100. If Taryn got her brains from her dad, then she got her sense of adventure from her mom.

During her mother’s travels, Taryn spent time with her grandparents in Germany. An aspiring ballerina, Taryn started ballet at age four and stuck with it everywhere she lived. Unsurprisingly, Taryn’s dedication and drive led her to become a Cecchetti-trained ballerina. An unfortunate injury sidelined her future as a professional ballerina, but she continued dancing through graduate school.

While Taryn was in high school, a summer internship at Sandia National Labs sparked her interest in engineering. Soon after, she started her self-supported university life at New Mexico State as a chemical engineering student. Between academic terms, she completed internships with Phillips Petroleum and a Union Carbide chemical plant. These summer experiences made a lasting impression as she recognized that the classes she enjoyed the most - and the ones...
Taryn (age 4) and father, Dr. Harald Melkus, in Guaymas, Mexico.

Taryn (age 28) and mother, Gisela Melkus, in Rome, Italy.

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in which she learned most effectively - were taught by professors with industrial experience. If she were to one day become a professor, she would first commit to working in industry for several years so she could help students to appreciate the practical applications of the theory.

Upon graduation, Taryn took a job with Exxon as an applications engineer at the Benicia refinery near San Francisco – an atypical starting position for an engineering new hire. She coded control programs to optimize the production of jet fuel and gasoline. Shortly thereafter, she was promoted to a management position, but later left Exxon, as sitting in meetings without technical work was not for her. Taryn knew that a graduate degree was the key to the type of work she wanted to do, and she wanted the type of challenge that came with a graduate education. She enrolled in graduate school at the University of Pittsburgh.

Taryn earned a dual MS degree in chemical engineering and petroleum engineering at Pitt. Her MS thesis involved the mathematical modeling of a coal prep plant, under the direction of Dr. Jack Tierney. Her PhD dissertation, under the direction of Dr. Shiao Chiang, focused on heat of immersion for coal in water.

In the midst of graduate school, Taryn has another unexpected, life-changing event - she met Gary Bayles and it was love at first sight! Gary is a great guy and a brilliant chemical engineer with a great sense of humor. Gary completed his PhD at Pitt in chemical engineering with Dr. George Klinzing. Although Gary and Taryn fell in love in graduate school, they initially ended up at different locations. After Taryn’s post-doc at the US Dept. of Energy’s Pittsburgh Energy Technology Center, she accepted a tenure-track chemical engineering professor position at the University of Nevada, Reno (UNR). Taryn would have excelled in the development of a research program, but as she incorporated her industrial experience into the classroom courses and undergraduate labs, she realized that her heart was in engineering education.

Taryn loved New Mexico and she loved UNR, but she loved Gary more. His opportunities in Nevada were limited, so she returned to Pittsburgh where Gary worked for Westinghouse in the Churchill Science & Technology Center, referred to as “the Egghead Ranch” due to the preponderance of PhDs. But Taryn did not want to be an Egghead - she wanted a job doing process-engineering design. However, Westinghouse was reluctant to have such a credentialed engineer go that route; Taryn stubbornly refused and offered to reapply with a revised resume that omitted her PhD. Westinghouse relented and Taryn worked to develop and implement engineering models used to simulate and design waste-to-energy processes. She also was involved with compliance testing and served as a translator/consultant during plant construction and start-up. The years at Westinghouse were more impactful than Taryn anticipated. She was involved in practical, meaningful engineering design experiences that were bolstering her aptitude to become a professor who could teach both theory and application. Training new employees rekindled her desire to be an educator. As her years ended at Westinghouse, her future as an educator emerged.
But that’s not all that emerged; the Bayles family grew during this time, with the birth of their children Alexandra and Nathan. Taryn took time off to be at home to raise their young children. When Alexandra was in second grade, science was removed from the curriculum. Taryn took it upon herself to teach her daughter, and other elementary school children, science. She developed and led a hands-on-science after school program for the next seven years. This program eventually led to a number of after-school and weekend programs (that she developed and led), most notably the Young Engineering and Science Scholars (YESS) Program. Taryn would arrive at the Historical Electronics Museum with her props on a week-night or on a Saturday to teach the students in engaging ways, with engineering design challenges and competitions.

After serving as a visiting assistant professor at Penn State’s New Kensington campus, Pitt and the University of Maryland, College Park, Taryn settled into the Chemical, Biochemical & Environmental Engineering Department of the University of Maryland Baltimore County (UMBC). Her enthusiasm and love of learning was contagious as she provided a unique cocktail of theory, hands-on activities, industrial experience, and real-world examples. Taryn shared this contagion with K-12 teachers, leading professional development for Project Lead the Way. Supporting K-12 students, Taryn used her unique style to co-author the INSPIRES curriculum (for high school students), as well as curriculum to introduce engineering to elementary and middle school students, via math and science classes. This curricula and outreach programs have impacted over 35,000 K-12 students. She also revamped the first-year engineering program at UMBC, and created hands-on design projects like the “renewable energy system” and “heart and lung machine” to connect the curriculum in a personal way to each student no matter where they were in their intellectual pursuit.

Taryn connected with students easily – her door was always open and she never turned a student away. She would work tirelessly behind the scenes advocating for students, arranging their class schedules, improving the curriculum, and providing inspiration. She took the time to teach, encourage, value, challenge, and mentor every student who came into her office; moving beyond advising on class registration to mentoring students about internships, career choices, managing difficult personal situations, and learning how to handle difficult problems at home or on campus.

Taryn sought no reward for these contributions; she was content knowing that she was helping young people become successful.

While Taryn’s beaming smile, charming wit, and effusive optimism served as an inspiration for the undergrads, her impact on staff and faculty peers cannot be understated. She mentored junior faculty and generously offered her time and talents to the betterment of the department. Her diverse teaching portfolio was on full display as she taught at least fourteen different classes in the department and the first-year engineering program for 16 years during which time enrollments more than quadrupled.

Taryn’s continual dedication to science and engineering education often made it to the dinner table where she would discuss the latest proposal she was working on. One evening she was pleased to receive a proposal from 8 year old Alexandra to increase her allowance. When Nathan was 12, he submitted his own proposal to start a lawn mowing business. Neither apple falling far from the tree, both have grown into very successful engineers: Alexandra is a Chemical Engineering Assistant Professor at the University of Delaware, and Nathan is a computer/software engineer at Manhattan Associates.

At the same time, Taryn was developing as a national leader in engineering education research and outreach programs. She served as the principal investigator for a STEM Talent Expansion Program grant, funded through NSF, dispatching her army of undergraduate chemical engineers into local high schools to demonstrate the importance of mathematics and science to the engineering field. Feeling the need to
empower middle school STEM teachers with the skills and confidence to integrate engineering into their classrooms, she co-developed the Teachers and Engineers for Academic ACHievement (TEAACH) program, funded by Northrop Grumman. While at UMBC, Taryn won the University of Maryland Board of Regents Award for Collaboration in Public Service in 2006 and the organization’s Award for Mentoring in 2009. During that time, she developed a number of programs, including Bits & Bytes and Computer Mania, and received several NSF grants from programs including CSEMS, IMD, EEC, SSTEM, DRK-12, and DUE.

In 2016 Taryn joined Pitt’s Department of Chemical and Petroleum Engineering as a teaching-track professor and was quickly appointed to a leadership position as the Vice Chair for Undergraduate Education. Our faculty immediately realized how fortunate we were to have a professor of such boundless enthusiasm, passion for teaching, kindness, and knowledge on our team.

She is familiar with seemingly everyone in our building - from the security staff to the administrative staff to the janitors and the faculty. Which would help tremendously if she ever had another situation like at UMBC where she was greeted by university police after she and a group of students drained a campus pond with their human-powered pumps. Jamie Gurganus, Lecturer in the First Year Program and in the Mechanical Engineering program at UMBC, recently reflected upon this project. Her “favorite and motivating facet of Dr. Bayles’ class was designing and fabricating a double piston pump.” She continued “The impact of going through the engineering design process, from the initial design to final demonstration, provided me with a comprehensive authentic beginning to my engineering educational experience. I dealt with understanding how positive failure can be and the professional inner workings of engaging individuals who were diverse and had various perspectives. By the way, our pump, although aesthetically pleasing, was a massive failure.”

Taryn celebrates her co-workers’ birthdays and anniversaries and has been known to spend hours filling offices with hundreds of annoyingly placed Post-It® notes and dozens of confetti-filled balloons. But her highest allegiance is to the undergraduates and their success. She has shown us how to improve our teaching with active learning, provide impactful office hours, wisely mentor our advisees, and elevate and encourage our teaching-track and research-track professors so that they can shepherd students to success. When needed, Taryn is not shy about reminding our faculty to occasionally rededicate ourselves to the “first love” that initially drew many of us to academic careers: educating, influencing, and making an impact in the lives of our students. Taryn has shown us how to embrace and appreciate that responsibility, and how to excel as instructors and advisors. Taryn’s passion for active classroom learning and outreach extends beyond her own contributions to helping other faculty in the department. She has continued her many outreach programs and has convinced many of her colleagues to include outreach projects in their classes. On
more than one occasion, a faculty member was short on supplies for hands-on demonstrations in one of the core chemical engineering classes at Pitt or for K-12 outreach activities. Among the many bins of active learning materials piled up in Taryn’s office, she dug out the missing supplies and hung those supplies on the faculty member’s door early in the morning before her own class.

Looking back at the last 20+ years of classroom education and education research at UMBC and Pitt, Taryn asserts that the most impactful classroom strategy that she maintained was mentoring her students through hands-on design projects. For example, in first year engineering classes with larger enrollments, Taryn takes the time to collect the hundreds of parts for a project, fills her office to the ceiling with everything she needs, and brings the kits to class along with a high level of enthusiasm. Students launch hot air balloons in her six-credit introduction to chemical engineering “pillar” to demonstrate energy balances and heat transfer, in the context of engineering design, teamwork, communication, and mathematical modeling. And occasionally, these balloons may end up in the street or on nearby buildings. Every year she rolls a cart of imploded cans down the hallway after class where she shows students the relationship between gas temperature and pressure. Her reach extends beyond the walls of the university as she develops and deploys outreach programs for K-12 students and training teachers to become more effective STEM educators.

Outside of her institutional roles, Taryn has also greatly contributed to both AIChE and ASEE. These are “her people,” likeminded individuals who focus on engineering education. Recently being named an AIChE Fellow in 2017 and earning the ASEE Lifetime Achievement Award from the Pre-College Engineering Education Division in 2020 and the ASEE Donald R. Woods Lectureship Award for Lifetime Achievement in Chemical Engineering Pedagogy in 2021, Taryn started looking toward establishing an endowment for the Chemical Engineering Summer School. For this work, she was recognized at the 2022 annual conference as AIChE’s Philanthropist of the Year.

What does the future hold for Taryn Bayles? Currently, she’s leading an NSF Broadening Participation in Engineering grant and mentoring our associate professors to excel in the ABET accreditation process. And because she does all things with excellence, Taryn is our ABET analyst, investigator, color commentator, influencer, auditor, auto-corrector, drill sergeant and mentor. Beyond that, Taryn is somewhat evasive about her future - no doubt plotting an incredibly beneficial plan to promote the success of the undergraduates in our department. Retirement? She threatens this occasionally, but remains unconvincing. She’s as enthusiastic about excellence in undergraduate education as she has ever been. We hope to see her in the hallways of Pitt for many years to come, as do the students and faculty who benefit from her extraordinary talent and dedication to the field.

Taryn and students observe their hot air balloon launch (pictured left) on the Pitt campus, 2022.