

*E. Casey Wardynski, Ph.D.*  
*Superintendent*



***BOARD OF EDUCATION***

*Laurie McCaulley - District 1*  
*David M. Blair - District 2*  
*Jennie Robinson, Ph.D. - District 3*  
*Topper Birney - District 4*  
*Alta Morrison - District 5*

---

Chairman Brooks and other members of the subcommittee, thank you for inviting me to share my personal experiences as a STEM professional who left industry to pursue a second career as an educator, at this hearing entitled *STEM In Action: Transferring Knowledge from the Workplace to the classroom*.

My name is Christine Sutton, and I am employed by Huntsville City Schools to teach students enrolled in Mathematics, Computer Science, and Cyber Security courses at Virgil I. Grissom High School in Huntsville, Alabama.

I'd like to begin by sharing my background with you. I graduated from Pennsylvania State University in 1981 with a Bachelor's Degree in Industrial Engineering and began my industry career as a software engineer working for Westinghouse, near Baltimore, Maryland, deploying automated manufacturing systems. I earned my Masters Degree in Computer Science from Johns Hopkins University to enhance my software systems engineering skills. Twenty-two years later I was a program manager responsible for leading teams of engineers and subcontractors to deploy public transit Computer Aided Dispatch/Automated Vehicle Location (CAD/AVL) systems.

In my mid-forties, I decided to broaden my life experiences by changing careers and began to take the steps to make it happen. As a parent I had many opportunities to volunteer at my children's schools and to help their friends with math assignments. I was amazed by how many students (and adults) disliked math and believed that I could transfer my love of problem solving to the classroom to change attitudes and build confidence.

As I explored my options for preparing to teach full-time I found that many local Universities had a narrow definition of the prerequisite education required to be accepted into a teacher preparation program. Engineering courses would not satisfy 400-level mathematics course requirements, my local Universities did not offer programs leading to certification as a computer science teacher, and industry experience was not recognized. However, Johns Hopkins University offered a full-time and a part-time program that acknowledged my engineering and computer science course work and allowed me to become a certified highly qualified secondary mathematics teacher with a Masters of Arts in Teaching. They also encouraged me to apply for the Christa McAuliffe Scholarship, since I was seeking certification in a critical shortage area, to receive tuition assistance in exchange for teaching three years in a Maryland public school.

I chose the part-time program so I could begin my teacher education at night while I continued to work, enabling me to confirm that I had an understanding of the demands of a teaching career before I left industry. Many of the instructors for this program were active full-time educators and administrators

from the Montgomery County Maryland School District who helped prepare career changers to succeed in a multi-lingual, inclusive classroom.

Before I could complete the program, my husband's company relocated us to Huntsville Alabama, and I repaid the scholarship money. However, Johns Hopkins allowed me to complete my full-semester teaching internship with Huntsville City Schools under the supervision of NCATE accredited University of Alabama Huntsville (UAH). After passing the secondary math Praxis and delivering my portfolio, I graduated from Johns Hopkins in spring 2007. My certification was recognized by Alabama because they have reciprocity with Maryland.

I applied for a teaching position with Huntsville City Schools, but there were no openings for secondary mathematics teachers. While waiting for a full-time position, I began working as a substitute teacher, and then accepted an industry offer to work as a system engineer and my security clearance was reactivated. Two weeks before the beginning of the 2008 school year, one of the mathematics teachers at the middle school where I did my internship left unexpectedly. Thankfully, the principal remembered me and requested that I be added to the list of applicants for the position.

For the next three years I taught math to middle school students. During this time, I became adept at using Alabama Reading and Math Test (ARMT) data to identify areas of weakness for individual students and within the school population, and collaborated with the other seventh grade math teacher to develop targeted interventions to try to strengthen the basic math skills of all seventh grade students. At the end of my first year at Challenger Middle School the percentage of students proficient on the 7th grade Math ARMT jumped 10 percent. Administration support was key to our success. The other seventh grade math teacher was assigned (and compensated) to serve as my mentor. She helped me develop solid classroom and behavior management strategies, and guided me through the reporting requirements mandated for struggling students and students with learning disabilities.

This summer I was given an opportunity to transfer to Virgil I. Grissom High School. Grissom is a large (2,000 student) Blue Ribbon Award winning school which hosts the Huntsville City School System's Academy of Applied Math and Science. The Academy is a pilot for Project Lead the Way (PLTW) and independently raises funding for teacher training, computers, and lab equipment from industry, community groups, and local political leaders. PLTW provides training and curriculum for courses which encourage hands-on problem solving activities in a variety of areas which have been shown to significantly increase interest and abilities in STEM related programs at the college level.

Grissom's Academy, which in its third year has an enrollment of 256 students, currently offers Introduction to Engineering Design, Principles of Engineering, Digital Electronics, Principles of Biomedical Sciences, and Human Body Systems (all PLTW classes). Through additional community partnerships it added Building Science (sponsored by the local chapter of Associated Builders and Contractors), Emergency Medical Training (EMT) (in partnership with Calhoun Community College), and Cyber Security (in partnership with the Career Technical Education Foundation and the SAIC corporation). The Academy plans to expand the course offerings this fall to include four additional PLTW classes: Civil Engineering and Architecture, Aerospace Engineering, Biotechnical Engineering, and Medical Interventions.

Currently, all the PLTW courses are taught by degreed engineers, and the Academy is enriched by community volunteers. The Engineering Applications course is supported by two UAH Engineering professors who work with the class once each week, and an ongoing engineering mentor (who also

sponsors the robotics team). An SAIC penetration tester works with my Cyber Security students twice each month and mentors our two Cyber Patriot Teams.

In addition to Cyber Security, I also teach Introduction to Computer Science, AP Computer Science and Algebra I. The environment at Grissom is ideal. It is the type of situation I hoped to find when I initially envisioned a second career as an educator. At Grissom I have an opportunity to work with students at every level and am able to bring my industry experience into the classroom in a meaningful way. This year I earned tenure and plan to continue teaching for at least the next ten years.

As mentors, industry professionals can enhance the delivery of STEM education when they:

- work closely with classroom teachers to help create projects which challenge students to apply their skills in new ways;
- model problem solving strategies and encourage students to collaborate (not compete) as they work toward a common goal;
- encourage students to become independent problem solvers who recognize opportunities for improvement and have the confidence to follow through with their own ideas and solutions; and
- help students imagine themselves applying their gifts and skills in a variety of contexts, to understand that a career in medicine is not limited to becoming a doctor or nurse, and engineers do more than draft designs.

I think one of the greatest challenges industry professionals face when they try to become mentors, is finding the time to work with the students on a continuing basis to build relationships and share a variety of experiences.

While they may have extensive expertise, they cannot lose sight of the fact that they are not just teaching their content, they are teaching students. Also, their involvement needs to extend beyond face-time with the students. They need to work with the classroom teacher to plan lessons and be willing to help supply materials if necessary. Finally they need to find an environment, like Grissom, which offers STEM courses and has a faculty and administration which welcome their contributions.

Professionals who are seeking to make the transition from industry to the classroom must overcome many impediments. If they want to teach full-time, they must:

- be willing and able to teach core subjects, not just engineering or technology electives;
- be prepared to teach students who come to their classes with various levels of preparation, not just advanced students;
- genuinely enjoy pre-teen and adolescent students, and be prepared to manage the inconsistent behavior which characterizes this stage in their development;
- work in classrooms with relatively high student to teacher ratios (Grissom has 101 instructors for 2000 students);
- be willing to give up their flexible schedules and work in relative isolation from other adults for the majority of the day;
- recognize that teaching involves a tremendous amount of preparation, especially when they are piloting new curriculum; and
- be prepared to continue their own education during their evenings and summers.

After they realistically assess and accept what full-time teaching entails, they must find a certification path which will culminate in the recognition that they are highly qualified to teach their core subject.

My expertise in requirements and criteria for certification is limited to my personal experience and the experiences of my peers. That said, I believe that quality formal teacher education is critical to long term success as an educator. I believe that teaching is a profession, which is the source of all professions, and that just because you know something does not mean you know how to teach it.

Teaching professionals must have a solid understanding of human development and learning, curriculum, instruction and assessment, and be able to work collaboratively to differentiate instruction for students with special needs. They must also be able to prepare their students to succeed in their post-secondary education.

I believe that the Federal government could pursue the following three avenues to facilitate the transfer of knowledge from the workplace to the classroom.

- 1) Encourage professionals who are considering leaving industry and accepting a significant pay cut (often greater than 50%) to seek teacher education by offering federally funded scholarships for certification in a STEM discipline in exchange for teaching three years anywhere in the country.
- 2) Facilitate programs like the Johns Hopkins University/Montgomery County Maryland School System partnership to encourage Universities to look for alternative ways to assess transferrable knowledge (like Praxis II) and partner with local school districts to enhance the faculty of part-time teacher education programs which target industry professionals looking to transition to the classroom.
- 3) Help school districts, like Huntsville City Schools, extend successful programs, like The Academy of Applied Math and Science, to additional secondary schools to create teaching positions for STEM educators.

To quote Seneca, “Luck is what happens when preparation meets opportunity.” I believe that the Federal government can play a meaningful role in facilitating teacher preparation and creating opportunities for STEM educators.

Thank you for inviting me to share my experiences with you this morning, and I welcome further opportunities to discuss ways to help equip students to meet the demands of continued education in STEM disciplines, which will prepare them for future employment in areas critical to maintaining our country’s security and prosperity.