

A Snapshot of Ohio:

Girls Behind the

STEM Equality Movement

By Pat Huston

Past a sea of spinning wind turbines and rows of solar panels, in the small northwestern Ohio rural area of Van Wert sits a new building where high school senior Erica Sullivan attends classes in math, English and manufacturing. She aspires to be a precision machinist.

Roughly 100 miles further north near Lake Erie in urban Toledo, Ohio, seniors Briana Lowe and Meagan Somers learn anatomy on the first floor of a 50-year-old high school. Courses in physiology correlate with clinical concepts in a slightly newer, second-floor health academy lab at the career center next door. The girls plan to be doctors.

In central Ohio, Gabriella Campana and her friend Jenny Heng are high school freshmen in the Columbus suburb of Reynoldsburg. They are exploring careers in chemical research and engineering, respectively.

These girls, who have never met and who hail from three distinctly different geographical regions of Ohio, are

breaking gender ground. They do it in the name of STEM Equity, aka the STEM Equity Pipeline. STEM Equity came into being five years ago, and its goals are to narrow the wage gap between men and women and to increase the quality and quantity of STEM workers. The “STEM” part of the initiative infuses excitement in the curriculum surrounding science, technology, engineering and math. The “Equity” part is just that—exposing girls to career paths more often associated with boys.

According to the U.S. Bureau of Labor Statistics, slightly more than 5 percent of machinists and 15.6 percent of chemical engineers are female. When it comes to physicians and surgeons, women are catching up to men: As of 2013, women make up 35.5 percent of these professionals.

“When I moved from studying medicine to manufacturing last year, [my] mom flipped out on me,” said Sullivan, 17, a student at Vantage Career Center, one of 14 Ohio high school STEM

Equity sites. “I convinced her that this is really what I want to do, so she gets it now.”

The stories of girls breaking down career gender barriers are repeated in the nooks and crannies of workforce education throughout Ohio and the United States. These stories are about the girls themselves. They are also about the people mentoring and encouraging them, as well as the activities and strategies engaging them.

Rural Van Wert, Ohio

Sullivan is one of 18 girls at Vantage who is finishing high school with a focus on careers traditionally associated with males. Wearing uniforms like their male counterparts, they weld, build, troubleshoot and enter data to output products and reports.

A cheerleader who takes evening hip-hop and jazz dance lessons twice a week, Sullivan admits she can be rugged and a “girly girl.” The tunes of country singer Brantley Gilbert are a favorite on her iPod. She has a boyfriend

How Ohio STEM Equity Emerged

First, there was equity.

On the heels of Title IX in 1972, the United States CTE “equity” nudge came from federal Carl D. Perkins legislation related to non-traditional employment.

Then, there was STEM.

Nearly 15 years ago, the STEM initiative emerged. STEM launched nationally to reinforce the need for higher proficiency and stronger application in STEM careers.

Today, it is STEM Equity.

Five years ago, Ohio was one of the first states to merge equity and STEM, primarily with the use of research-based strategies from the National Alliance for Partnerships in Equity (NAPE). Ohio STEM Equity, also called the STEM Equity Pipeline, began with a focus on grades nine through 12. In the fall of 2013, a seventh and eighth grade component was added.

Why and How It Works

NAPE associates STEM Equity with two types of improvement: institutional, which focuses on systemic non-discriminatory practices, and individual, which homes in on educators and their teaching strategies and relationships with students.

During the 2013–2014 school year, small cohorts of Ohio STEM Equity educators further embraced individual improvement through micro-messaging, drilling down to the heart of their own prejudices and how that translates into actions and words.

According to NAPE, STEM Equity exists for four reasons:

- Individual, family, community transformation. Women earn 33 percent more in STEM-focused jobs than in other jobs.

- Economic development and growth. Jobs go unfilled because there are not enough qualified men to fill them.
- Innovation. Multiple lenses and perspectives enhance ideas and the work.
- Ethics. Opportunities for all—regardless of gender, race and/or ethnicity—is the right thing to do.

Ben Williams, Ohio STEM Equity Pipeline project director and also affiliated with Columbus State Community College, is the driver for Ohio STEM Equity, which is administered by the state’s Office of Career-Technical Education at the Ohio Department of Education.

Mimi Lufkin, CEO of NAPE, is the key national partner. Led by the Ohio STEM Learning Network’s Director of Operations Dustin Pyles, Battelle Memorial Institute is the Ohio middle school partner. Battelle, the world’s largest non-profit research and development organization, sponsors projects with multiple age groups at many locations focused on both STEM and STEM Equity. This K–12 career development approach aligns with Ohio Gov. John Kasich’s Career Connections initiative.

In FY2015, Ohio has 17 STEM Equity sites—14 involving grades nine through 12 and two with seventh and eighth grade students. The 17th location connects to the micromessaging project.

“STEM Equity fits with what we are about in [CTE]—allowing all students maximum opportunities to learn in and choose the careers they want while helping industry meet its needs,” said William Bussey, Ohio state director of career-technical education.

who takes her bowling and to movies. “She hunts and she fishes,” her boyfriend, Ross Siefker, remarked from his welding lab down the hall at Vantage. “I’m fine with who she is.”

James Bibler, president of D4 Industries, a small machining company where Sullivan worked last summer, is fine with her, too. If she wants it, he has a full-time job waiting for her after she graduates this spring. He has seen Sullivan’s pleasure in operating a lathe and programming commands into machines. Her eyes light up when she talks about “the cool things that happen” when operating a water jet to manufacture parts.

“Today’s manufacturing work is more technical,” Bibler said during a trip to Van Wert from his Ottawa, Ohio, company. “Anybody who has mechanical aptitude and a good attitude—male or female—is an asset.”

About the only thing Sullivan cannot do, according to Larry Ray, her Vantage Precision Machining teacher, is lift a 60-pound lathe chuck, but neither can the male students in the class. According to one of them, “We don’t lift it alone either. We put a board under it and lift it in twos.”

Sullivan and other female classmates studying within male-dominated occupations get added encouragement as a group through a quarterly STEM Equity “Lunch and Learn” activity. Run by Community Relations Coordinator Mary Jo Wilhelm, the girls have lunch and talk with women successfully employed in non-traditional careers, reinforcing that barriers can be overcome and that they are not alone in their challenges.

“Our community’s root cause for girls changing their minds is family misunderstanding of [STEM] careers and the academics connected to them,” Wilhelm said. “I did that to my own daughter by telling her how bad I was in math. I am not making that mistake with my granddaughter.”

While high school equity activity is valuable, so are connections to younger

male and female students. A STEM Equity site since 2012, Vantage also has strategies that target children as young as age seven. During a summer camp, children dig at a local quarry, draw pictures of themselves “on the job” and cook hotdogs in handmade cardboard and foil solar cookers. During the school year, fourth graders participate in a Vantage-coordinated career fair. And local seventh and eighth grade girls are engaged in a “Step Into Your Future” career day.

Suburban Reynoldsburg, Ohio

“You should never judge somebody by the color of his or her skin.”

“Why is it that boys seem to have more fun than girls?”

“Some boys like to play with dolls, and that’s okay.”

The fifth graders at Baldwin STEM Middle School in Reynoldsburg, Ohio, reflected on what they gleaned from TV commercials. In one, boys, all light-skinned, jumped around and made noise while racing toy cars. In another, a group of girls, all white, sat in a circle, smiling and combing their dolls’ hair.

These, the class of two dozen fifth graders from 10 different countries explained, are examples of micromessaging. It’s a big word for them but they get what it means—talking and acting differently among people based on gender or culture or both. And they know, even at this young age, that micromessages like these are wrong.

The Reynoldsburg 10-year-olds lucked into a non-traditional-focused class because two STEM Equity-trained teachers, Rachel Lovely and Kelly Wood, moved from eighth grade to fifth grade assignments for the current school year. Columbus-based non-profit Battelle Memorial Institute supports their work with younger students, while the impact of their former students—Gabriella Campana and Jenny Heng—is rippling through the high school.

Ninth grader Campana, 13, was in



▲ Erica Sullivan with her teacher Larry Ray (left) and James Bibler (center), her employer.

fifth grade when she noticed she was different from most other girls. Heng, 14, a friend of Campana’s, sensed she was different, too. Three years later, STEM was the glue for them as eighth graders with teachers Lovely and Wood. Campana is gravitating toward chemical research, while Heng wants to be a chemical engineer.

Sitting in a Starbucks on a chilly Ohio day, Campana said her parents never put her in a “girl box.” She had support at home and teachers who ignited her love of science.

“We are both kind of introverted,” said Heng, who has parents native to China and Indonesia, and a role-model cousin working in biomedical engineering. “That didn’t last long with Mrs. Lovely and Mrs. Wood.”

For 30 minutes each school day, the eighth grade class of girls and boys were exposed to science and social studies in a new way. They learned how women saved lives during the Holocaust and the sinking of the *Titanic*. They saw women not as victims but as take-charge survivors who exhibited bravery, ingenuity and compassion.

They also explored the mechanics of the sinking ship and the structure of living quarters for Jewish prisoners. The STEM-connected ideas and energy of the two teachers were compelling, and their students gravitated toward their enthusiasm.

Campana and Heng actually found themselves teaching their class at times. “Boys were coming up to us and asking for help with building and design,” Campana said. “They still do. Now, we are known as leaders.”

Urban Toledo, Ohio

Near the Ohio-Michigan border, select students at Whitmer High School and the adjoining career center study a preserved human brain—one of four plasticized organs normally locked in a classroom cabinet. A smaller selection of teens travel to the University of Toledo College of Medicine to dissect the spinal cord of a donated body.

“Girls tend to be more openly squeamish because they are more verbal, but in the end, gender doesn’t matter when it comes to success in science careers,” said Bernadette Terry, a teacher for 25

Ohio STEM Equity Leaders

Ohio teachers and school administrators point to Ben Williams, Ohio STEM Equity Pipeline project director, as the lynchpin and the “energizer bunny” for Ohio’s movement.

Williams lauds Mimi Lufkin, CEO of NAPE, for her leadership and mentorship. Lufkin points to everybody.

“Ben’s leadership and energy are helpful, but it takes more than one person to do the work,” Lufkin said. “In Ohio, all the right things are in place. That doesn’t always happen.”

Williams realizes the groundwork was laid in college for the work he leads today. He was one of the first men to attend the formerly all-female Wheaton College, where the curriculum was intentionally gender-balanced.

“As a white male, I have never personally experienced the same level of prejudice and biases encountered by females and people of color, but I am aware they exist and am driven to do what I can to eliminate them,” he said. “The root causes are complex ... But this I know: When girls are more successful, boys get better, too.”

Lufkin draws some of her passion from experience. She was an agriculture mechanics teacher in the late 1970s when few females had that role. Over the past 20 years as NAPE’s CEO, she has come to understand well that the United States cannot be competitive with 50 percent of the population not available to make that happen. The good news, as Lufkin sees it, is that equity gaps are closing in medicine and law.

“You first need to recognize that everybody has some bias,” she said. “Then you understand that it’s not just about fairness, but about giving each person and student what they individually need.”

years. “Passion for science follows the person.”

Briana Lowe, 18, and Meagan Sommers, 17, have that passion. They thought about being nurses, but decided to take their career goals up a notch to become pediatricians after exposure to two teachers: Terry (at the high school) and Brad Tolly in the career center’s medical academy. To every “why” and “how,” these two teachers encouraged the girls and offered advice under what the school refers to as “STEMM,” with the second “M” for medical.

“I had so much on my plate and then had STEM Equity added because our non-traditional enrollment numbers were low,” said Deb Heban, Whitmer’s CTE director. “I felt overwhelmed with what we needed to do until three teachers jumped up and took the reins.”

The third teacher at Whitmer is Jamie Squibb, a Project Lead the Way engineering teacher. Terry and Squibb designed different career-focused camps for students in seventh grade, which is the earliest grade in the national career and technical education (CTE) model.

“[These camps] are valuable, but the seed needs to be planted earlier,” Squibb said. “By the time students get into seventh grade, many girls have already decided they don’t like math and science.”

Lowe and Sommers played a role in turning that around when serving as leaders for a summer 2014 “Medical Mania” career camp for 16 students in seventh and eighth grades. In small groups, students created human cells from cookies and candy and designed unclogged and pillow-clogged arteries from large cardboard boxes. While the girls outnumbered boys two to one, the student leaders initially noticed that boys gave orders about roles for group activities while girls did the work. Boys also were initially faster as they moved through the simulated arteries.

“I became tuned into gender differences,” Sommers said. “By the end, I saw that the girls were speaking up and were actually faster than the boys—

something they didn’t exhibit at first.”

While the STEM Equity impact will not be evident in high school gender enrollment breakouts for a few more years, Heban said, “So far, this has turned out to be one of the best things we have done,” to close the gender gap.

Conclusion

As 2015 began, roughly 150 Ohio teachers and administrators are engaged directly in STEM Equity. Through training, they are more aware of the impact of stereotyping the individual student, the workplace and society as a whole. Recognizing the biases of race, gender and ethnicity is the first step. These prejudices occur through spoken words, body language and images in textbooks and advertisements.

Creating an environment of student acceptance, comfort and growth are critical next steps. Stripping education of hurtful and negative experiences is the STEM Equity process. The product—students graduating from a program and working in careers they are passionate about—is one that benefits all. **Tech**

Pat Huston has worked in Ohio CTE for 25 years, including the last 16 at the Ohio Department of Education. A former news reporter, her roles in the state Office of Career-Technical Education include serving as project manager for the STEM Equity initiative and state oversight for CTE Arts and Communication programs. Since 2009, she does volunteer gender equity work in Uganda. She can be reached at pat.huston@education.ohio.gov.

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To find out more about STEM Equity in Ohio, visit:

www.stemequitypipeline.org/

www.osln.org/2014/09/tackling-equity-in-stem-fields/

www.osln.org/

www.stemequitypipeline.org/StateTeams/OH.aspx

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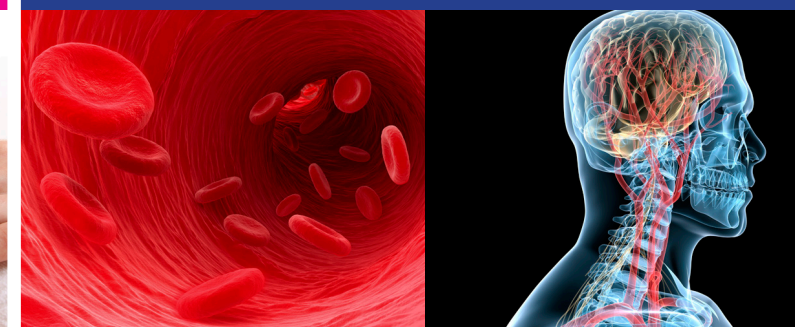
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