Engineering Change

How one school overcame the gender divide to bring math-whiz women into one of the most male-dominated fields in the nation.

CARL O’DONNELL | CONTRIBUTOR

White, affluent, and male: three adjectives nearly as true for engineering today as they were in the 19th century. About 75 percent of engineers are white (another 13 percent are Asian). Most make salaries of over $80,000 per year. And the vast majority – 89 percent – are men.

Granted, things have improved. As recently as the 1970s, women made up a mere 2 percent of the industry.

The prospect of being the only girl in the room, along with the timeworn trope that “girls don’t do math,” could be enough to scare plenty of women away from the profession. Doubtless, it does. But it hasn’t stopped Rachel Aliparo, Hillary Guardo, Lorelle Suriano or any of the other women who together comprise 30 percent of Villanova University’s College of Engineering.

Perhaps 30 percent doesn’t sound like much. It certainly doesn’t stack up to other, equally technical fields like medicine, where female students are the majority. But it’s not bad compared to the national average for engineering colleges: 18.2 percent.

Only 10 years ago, Villanova was in the middle of the pack, with women comprising about 20 percent of the College of Engineering. This was the period when the first wave of reports about America falling behind in “STEM” (science, technology engineering and math) fields – partly because of the lack of diversity – began capturing the public’s attention. In 2005, Villanova conducted an internal report on diversity, and realized that it wasn’t contributing to the solution. That’s when things started to change.

In order to draw more women into the field of engineering, the school had to answer two key questions: What attracts women to the field? And what drives them away?

Women often think that an engineer toils away in isolation, accompanied only by a calculator and the walls of her cubical, said Amy Fleischer, a professor of mechanical engineering. Women also think that engineering lacks a social impact. How could the field offer the same feel-good opportunities as a “helping profession” like medicine?

Indeed, studies by the National Academy of Engineers say that women, more so than men, are motivated by helping others. But such opportunities in engineering are hardly lacking.

Case in point: Hillary Guardo. The 2013 graduate in mechanical engineering spent much of her time as an undergraduate performing service projects all over the world. She built preschools and mine-neutralizing robots in Cambodia. She built a house for a family in Belize. She helped conserve rainforests in Costa Rica. She even built playgrounds for HIV positive orphans.

The reality is that the tools used by engineers can be – and often are – applied toward social betterment. Notably, the subfields of engineering that have effectively communicated their social impact, such as biomedical and environmental engineering, just so happen to also have a 50-50 gender balance.

The fear of isolation is equally off base. Engineering is a collaborative discipline, with complex projects demanding team effort, said Fleischer. Take Lorelle Suriano. This 2013 Villanova grad in mechanical engineering spends virtually all of her workday interacting with others. As a sales engineer, Suriano uses her engineering expertise to understand how all the products of Carrier Corp. work, both individually and in tandem. Then she helps clients fit products to their needs.

Correcting public misperceptions is central to attracting female students. For example, the College of Engineering hosts eight outreach programs for hundreds of underrepresented middle and high school students throughout the region each year, one of which, VESTED (Villanova Engineering, Science, and Technology Enrichment and Development), has brought 350 underrepresented students to the college.

But while women have inched up to nearly 20 percent of engineering students,
they only constitute 11 percent of engineers. Something is causing these highly trained, mathematically gifted female engineers to drop out.

In fairness, many women simply branch off to other related fields. A University of Wisconsin study notes that most women who leave engineering are not taking a pay cut, meaning they are simply applying their skills elsewhere.

A perfect example of this is Robin Longo-Loporchio. She graduated from Villanova in 1989 with a degree in electrical engineering. In her senior year, she developed a keen interest in patents. So she got a job in the U.S. Trademark Office, went to law school and now works as an intellectual property attorney at Raytheon Co. Longo-Loporchio said she never felt disadvantaged as a woman, and uses her knowledge of engineering every day.

Also, about a third of women who recently left the field became full-time parents, said the study. But some leave for less benign reasons. There is a glass ceiling in the profession, with the executive suite looking disturbingly like an “old boys club.” There is also a feeling among some women of belittlement.

Surriono faced the latter throughout her career. She describes meeting male engineers who were shocked that she was in the profession, and responded by “looking at me strangely, and then being completely dismissive,” she said. Guardo has felt self-conscious as a “blond-haired, blue-eyed female,” and says she sometimes has to work harder to earn men’s respect.

The glass ceiling is more complicated. Fleischer notes that many female engineers – surrounded by a fraternity of tight-knit men – struggle to find mentors who usher them up the ladder. A lack of satisfactory accommodations for women with families is also a problem, said the Wisconsin study. These are issues in many industries – only 14.4 percent of Fortune 500 executives are women – that are exacerbated in the unusually male field of engineering.

On the bright side, women face some advantages as well. The most obvious is that they stand out. This is no small edge, notes Villanova College of Engineering Dean Gary Gabriele. Companies have a strong business incentive to seek diverse perspectives. The other perk? Women form tight bonds in the engineering field that mean networking opportunities.

Longo-Loporchio said that almost all of her job leads came from women in technical fields. Surriono said a senior female co-worker promptly took her under her wing. Guardo describes women providing her with business cards, job leads, and opportunities to meet top female executives for lunch. Rachel Aliparo, a 2013 Villanova graduate in mechanical engineering, enjoyed close relationships with female faculty.

Aliparo, who will be traveling the country as a validation engineer, felt the bond among women most strongly during college graduation. For most of her college career, she had been the only girl in her study groups. Suddenly, she encountered her entire cohort of female mechanical engineers. She had no idea there were so many like her.

“There was an unspoken bond we all shared,” she said. “There was this feeling, as we all accumulated physically, that we did it – who said girls can’t be engineers?”

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FOUR WHO ENGINEERED CAREERS

**RAHCEAL ALIPARO**

**Hometown:** Livingston, N.J.  
**Major:** Mechanical engineering  
**Minors:** Spanish, bioengineering  
**Graduation Year:** 2013  
**Current role:** Validation engineer at VALSPEC

*Why Villanova’s College of Engineering?* Rachael was drawn to the school pride, exemplified by the Wildcats basketball team. She also thought the school’s student population of about 7,000 was the perfect size, and appreciated Villanova’s many service opportunities.

*As a woman in engineering* ... Rachael enjoyed fantastic networking opportunities and a sense of community. But she was the only girl in her study group and the only engineer in her all-girl dorm.

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**HILLARY GUARDO**

**Hometown:** Flemington, N.J.  
**Major:** Mechanical engineering  
**Graduation Year:** 2013  
**Current role:** Nuclear engineer at the U.S. Navy

*Why Villanova’s College of Engineering?* Guardo chose Villanova over Cornell, Johns Hopkins, Notre Dame and others because of the small classes and accessibility of professors. The full-ride scholarship didn’t hurt either.

*As a woman in engineering* ... Guardo enjoyed highly accessible female professors, lunches with female engineering executives and connections with opportunities, but felt that she had to work extra hard to prove herself to some men.

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**ROBIN LONGO-LOPORCHIO**

**Hometown:** Andover, Mass.  
**Major:** Electrical engineering  
**Graduation Year:** 1989  
**Current Role:** Senior intellectual property counsel at Raytheon Co.

*Why leave engineering?* Back in college, a senior pointed Longo-Loporchio towards the field of patents. Since patents are technical, she knew her engineering background would come in handy. After trying out the field at the U.S. Trademark Office, she was hooked.

*As a woman in engineering* ... Longo-Loporchio never felt disadvantaged. But she certainly enjoyed enhanced networking opportunities, as nearly all of her job leads came from women.

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**LORELLE SURIANO**

**Hometown:** Myrtle Beach, S.C.  
**Major:** Mechanical engineering  
**Graduation Year:** 2013  
**Current Role:** Sales engineer at Carrier Corp.

*Why Villanova’s College of Engineering?* Surriono was drawn to the sense of community fostered by small classes, service outreach, and close relationships between students and professors.

*As a woman in engineering* ... Some male engineers were thrilled that a girl was pursuing engineering. But others seemed surprised, even off-put. Some dismissed her completely.