

How to Be a Great Advocate for Women in Engineering

By Cynthia M. Furse

Abstract: This article describes six things we can do to advocate for all of our colleagues, particularly women and minorities.

I dream of a day when my granddaughters and grandsons PUZZLE over why we used to have an IEEE Women in Engineering program -- because in their world, there are just as many women as men (and black, white, yellow, brown, and tan men and women) in engineering, and who ever heard of a Men in Engineering society? Today, we are stepping towards that day, winding our way on a Path of Change that will lead us to a place where it doesn't matter if you are a man or a woman or where you come from or what color your skin is or anything else -- all that will matter is can you turn Maxwell's Equations into amazing things that can help the human race.

So today I want to talk about that Path of Change, and how You, We, Us -- every one of us -- can be a Great Advocate for the women, for the minorities, and in fact for everyone around us. And through that advocacy, we can all become stronger, as we make the world a better place for us, for our children, and for our grandchildren. So let's start at the trailhead on our Path of Change....

Great Advocacy #1: Look Around You, and Take Notice.

The first step in being a Great Advocate is just noticing what your community looks like -- who is here, and who is missing -- and caring about it. Are there men and women of all kinds, people with different backgrounds and experiences who can think through a problem in different ways? And if you are missing someone, if your team is too homogenous, get curious, and ask why? Care enough to ask, to explore, to be truly curious. Be genuine, be who you really are, and don't be afraid of what you may find.

The percentage of women in engineering varies tremendously around the world [1], [2], which is quite visible from three photos, below, of electrical engineering classes in Iran, Puerto Rico, and my class at the University of Utah. I'll let you draw your own conclusions about gender diversity from these photos. When there are differences in the gender pipeline from place to place, as you see here, it is a good challenge to ask "Why?", and seek to find the systemic issues that lead to this disparity.

If you are missing someone from your team, the easy answer, of course, is that there just aren't that many women/minority students/grad students/post docs/faculty/engineers/managers/whatever to choose from. But that is a pretty cursory answer for people who think as deeply about complicated system-level design problems as engineers do. There may be a temporary bottleneck in the supply chain, but that hasn't stopped Amazon during Covid, and it shouldn't stop us either. We can do better, and if each of us does a little, we can open up that bottleneck over time.



Electrical engineering class from Sharif University, Tehran, Iran (thank you to Masoumeh Nasiri).



Electrical engineering class from University of Puerto Rico (thank you to Rafael Solis).



Electrical engineering class from the University of Utah.

Great Advocacy #2: Reach Out and Get to Know Everyone's Skills. Actively Connect.

REACH OUT within your team, your community, your technical society (IEEE APS). Introduce yourself, welcome new colleagues, and find out more about others – all kinds of others. Find out more about everyone's skills, and their goals, and what they would like to do.

CONNECT your colleagues, and actively advocate for and advertise their specialized skills. Actively watch for opportunities to share and use everyone's skills, and to help everyone move in the directions they would like to go. Be an active connector in your community. What does that mean? Just SAY something to your friends and colleagues – "Have you seen what Ms. XX has been doing in the lab? It's making a big difference in our ability to measure YY. You might want to try her method." Put a recurring reminder on your calendar to reach out to your younger colleagues, particularly those who are diverse. If you are a younger colleague, put a reminder on your calendar to reach out to peers and to mentors.

INVITE and ENCOURGE your colleagues to share their skills. So often we are not aware of the incredible things our colleagues are doing, and can enjoy and learn from them. Invite your colleagues (be sure to include your diverse colleagues) to give a talk to your class or engineering group, your department seminar series, your local IEEE group. Invite someone who has recently mastered a specialized skill to create and share a tutorial to help others get started too, and to share that tutorial in the IEEE APS Resource Center (see ieeeps.org). Actively look for ways to help everyone expand and improve their skills. And actively look for opportunities to give everyone a chance to lead and shine.



A Great Mentor (my master's advisor), Dr. Magdy Iskander, is constantly bringing people together both formally (through conferences and workshops) and informally (just making connections).

Great Advocacy #3: Make Sure Everyone's Voice is Heard

Engineering problem solving benefits greatly from many different perspectives and viewpoints, but only if they are heard. Often, women and people from diverse backgrounds, or just people who happen to be quieter, do not feel that their opinions are heard or valued. Women are less likely to ask and express their questions [3] and less likely to talk or be heard in meetings [4]. This means that their valuable contributions can be easily missed. There are active ways to combat this, and both formal / structural processes and informal (advocacy!) approaches are needed.

Let's talk about the informal advocacy first, because all of us should be watching for the need to speak up. When you are in a meeting, seminar, classroom, or any other group event, actively watch the room for people who may want to speak but "can't get a word in edgewise", or people who are very quiet and

not sharing their thoughts, or people who share an idea, but it is immediately “lost” or put down in the discussion. Speak up – “I think Ms. XX has an idea.” Or ask your colleague during a break if they have an idea that hasn’t been brought to the table (and then bring this up, asking them to share it after the break). If you are moderating a discussion, assign someone to specifically help you watch for questions/ideas, and bring them to the forefront. Help to amplify the voices that might otherwise be lost.

Structurally, provide multiple venues for voicing ideas and questions. Zoom meetings are teaching us a lot about this. After and during a Zoom lecture, some participants will ask questions verbally, but many more are likely to post their questions to chat. More participants can be encouraged to ask questions/give feedback if you use an online poll, where the expectation is that everyone will post feedback or a question. Using this structure during engineering meetings (both in person and online) can help as well. In an engineering review meeting, for instance, having an online system where people can list their concerns, that is visible during the review meeting, can ensure that all concerns are registered and addressed.



Great Questions – Randy Haupt has raised ethical questions to the IEEE APS Community through his Ethics Column in the AP Magazine that has challenged us to think.

Give people time to think, discuss, and share their voice after a bit of thought. When you have something complex and possibly debatable to work out, try a 3-meeting framework. The first meeting is the Introduction and Questions meeting, where the goal is to learn about the proposal and gather the key questions that need to be addressed before we can make a decision, and action items for who is going to collect that information. The next meeting will be the Discussion meeting where we now have gathered enough information to have a meaningful discussion. The Decision meeting follows. This Intro, Discussion, Decision framework seems to help a group reach complex decisions.



A Great Supporter – Christos Christodoulou, who once zoomed into the IEEE APS Women in Engineering picture (2002).

Great Advocacy #4: Snuff Out Systemic Discrimination

In our jobs and schools, there are so many processes (hiring, evaluation, promotion...) where we try to be fair. We know that everyone, all of us, have biases, and we try to set up systems that reduce the effects of these biases. But sometimes those fair processes actually have our biases built into them. Student teaching evaluations are more critical of women [5] and racial minority instructors [6], letters of recommendation [7] and reviews of resumes differ based on the gender of candidates [8], students are advised into or out of engineering based on their gender [9], and more. We don't want these biases to creep into our processes, but they often do. So what can you do? Learn about systemic biases and become aware of your own biases (yes, we all have them). Project Implicit [10] is a good resource, and there are many others. And then actively advocate to remove biased approaches from the evaluation system in your organization. Just because we've always done it that way does not mean we have to keep doing it.



The Great Ross Stone – who helps APS run fair and square.

Great Advocacy #5: Be Brave, Stand Up

At some time in your career, you are likely to see or hear blatant or hidden bullying or discrimination of some kind. This is a tough moment. What to do? Should you ignore it, laugh with the joke, and be part of the crowd? Should you make a big scene, and embarrass the bully? Should you talk with them in private? Should you talk to someone more senior/powerful in the group and ask them to help? What do you do to help the victim of the bullying or discrimination? So I'm going to ask you, personally, to Be Brave and Stand Up. Decide what you think is the right thing to do, and just DO it. Each situation is different, and all are confusing. Usually it seems to work best to talk privately with the person behind the bullying or discrimination, and ask them what they meant or intended, and then share how it actually came across to you. And then for the person who was the victim in this case, talk with them too and let them know you saw their discomfort and ask if there are things you might do to help. And then

pay attention and be aware. If a situation is truly out of hand, get help. There is always a manager/human resources/chair/dean/etc. whose job it is to actually handle these problems. If a problem needs to be elevated, then do so. It's hard, but it's important.



A Great Advocate, John Volakis, looks for opportunities to lift others up.

Great Advocacy #6: What Can IEEE Antennas and Propagation Society Do?

IEEE is a key part of our professional lives. IEEE peer review lends credibility to our work. IEEE Senior Member, Fellow, and Awards are marks of great professional esteem and honor. IEEE leadership (AdCom and committee participation, editorships and associate editorships, being asked to peer review) is a sign of acceptance by our professional peers. All of these can impact how our peers back home see us. They are important. And they need to be inclusive. Here are a few suggestions for changes in our current IEEE APS Processes:

- 1) **Open Calls for Participation:** For all of our committees, AdCom nomination, editorships and associate editorships, we should reach out as broadly as possible for inclusive participation. We should have an open call each year asking for nominations and self-nominations (volunteers).

We should encourage our colleagues to apply, and look around broadly for whom to nominate, and we should volunteer ourselves when we are ready to give back to IEEE.

- 2) **Award and Fellow Advocates:** In our current IEEE Awards process, Fellows and Field Awards are nominated by colleagues who know them well. But what about well-qualified candidates who may not personally know a Fellow or other senior member to nominate them? This is likely to be true of candidates in industry and some regions of academics, where there tend to be fewer IEEE members and less travel to conferences. Having an Advocate or Advocacy committee could help match prospective nominees with willing nominators, deliberately broadening the pool.

Plan for Great Advocacy:

“A goal without a plan is just a wish.” -- **Antoine de Saint-Exupéry**

So now make a plan. Mark your calendar with regular, recurring reminders to Look Around and meet a new colleague (like go to lunch with someone you don't know at the IEEE APS conference), to contact mentors/mentees, to seek strong candidates (from all backgrounds) to nominate for Fellow and IEEE Awards (due in Dec. each year). Make one goal and one plan for something you can do to advocate for diversity in your organization. Because with each little step, we can round the bend on this Path of Change, so that one day our grandchildren will puzzle over why there was ever a Women in Engineering Program? Because to them, that will seem so strange.....



Great Advice from Constantine Balanis has helped me throughout my whole career.



Great Professor – And no tribute to my mentors would be complete, without a thank you to my dear Professor, Dr. Om Gandhi, who helped me be Curious.

References

- [1] V. Galpin, "Women in Computing around the World : an Initial Comparison of International Statistics," 2002. /paper/Women-in-Computing-around-the-World-%3A-an-Initial-of-Galpin/7723b7dace2ea6cf463980308fee029eee9df668 (accessed Sep. 18, 2020).
- [2] S. Peers, "Women in Engineering Statistics - version January 2018," 2018, doi: 10.13140/RG.2.2.35710.02882.
- [3] A. J. Carter, A. Croft, D. Lukas, and G. M. Sandstrom, "Women's visibility in academic seminars: Women ask fewer questions than men," *PLoS ONE*, vol. 13, no. 9, p. e0202743, Sep. 2018.
- [4] D. Tannen, "Talking from 9 to 5: How women's and men's conversational styles affect who gets heard, who gets credit and what gets done at work," *Understanding inequality: the intersection of race/ethnicity, class, and gender*, vol. 173, 2001.
- [5] K. M. W. Mitchell and J. Martin, "Gender Bias in Student Evaluations," *APSC*, vol. 51, no. 03, pp. 648–652, Jul. 2018, doi: 10.1017/S104909651800001X.
- [6] L. D. Reid, "The role of perceived race and gender in the evaluation of college teaching on RateMyProfessors.Com.," *Journal of Diversity in Higher Education*, vol. 3, no. 3, pp. 137–152, 2010, doi: 10.1037/a0019865.
- [7] J. M. Madera, M. R. Hebl, H. Dial, R. Martin, and V. Valian, "Raising Doubt in Letters of Recommendation for Academia: Gender Differences and Their Impact," *J Bus Psychol*, vol. 34, no. 3, pp. 287–303, Jun. 2019, doi: 10.1007/s10869-018-9541-1.
- [8] C. Isaac, B. Lee, and M. Carnes, "Interventions That Affect Gender Bias in Hiring: A Systematic Review," *Acad Med*, vol. 84, no. 10, pp. 1440–1446, Oct. 2009, doi: 10.1097/ACM.0b013e3181b6ba00.
- [9] T. Iskander, P. Gore, A. Bergerson, and C. Furse, "Gender disparity in engineering: Results and analysis from school counselors survey and national vignette," 2012, pp. 1–2.
- [10] "Project Implicit." <https://implicit.harvard.edu/implicit/> (accessed Sep. 18, 2020).