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Equality and Diversity in (Electrochemical) Sciences – 30 Years of Observations

by *Sannakaisa Virtanen*

Let me start by introducing myself, as my background plays a role in my view on equality and diversity (in life and in science). Growing up and being educated in Finland, I did not truly realize how privileged I was in this Nordic country that enabled me to pursue my goals and dreams in life, never wasting a thought on possible gender-related limitations on my choices and opportunities—and looking back I do not think it did (or else, I never came even in the vicinity of the “glass ceiling”). Of course, I knew that I grew up in a country where women had already gotten the right to vote in 1906 (one of the first countries in Europe to do so), but in general gender equality (or inequality?) was not a significant issue in my life. After my studies of Materials Science and Engineering in Finland, I moved to Switzerland and found myself in a country where in one part of the country women still did not have the right to vote (in the canton of Appenzell Innerrhoden, women were granted the right to vote in 1991). I was somewhat surprised to realize that the “traditional” family model in this mid-European country was far more typical than what I had mostly experienced in Finland, where it was quite typical that both parents worked outside of the home. During my PhD studies, I frequently encountered situations where I was the only female person in a research group or in a project meeting. Initially feeling somewhat intimidated in a group of experienced (male) scientists, I grew stronger and more self-assured, convincing myself that my research was not less interesting due to my gender. In general, I did not feel discriminated against because of my gender or my nationality. And, if in a rare case, a doubt or a question was raised about my ability to do something simply due to my gender, this skepticism merely triggered me to perform better. Through these early years I was mostly lucky to have been surrounded by people who trusted me and therefore challenged me to achieve more.

About twenty years later I moved to Germany, after spending time for research stays in the United States and Canada. Both stays were very valuable for my professional development. Changing the working environment and encountering new colleagues increased my energy and motivation and generated many new ideas and inspirations.

Today, the spirit of the Nordic countries, with their natural and self-evident equal opportunities for women and men, is not yet fully alive in mid-Europe, notwithstanding increasingly intensive discussions on gender and diversity, topics ranging from children’s day care to quotas for women in various high-level positions. When I lived and worked in Switzerland—due to the highly international faculty and the fact that this small country has four national languages—English was commonly used and fully accepted as a working language; thus, with it being a foreign language for many, there was a high level of tolerance on language (i.e., speaking a language perfectly was not expected and language skills had little influence on the evaluation of scientific performance). However, after I moved to Germany, the importance of a good command of the German language became an issue. Despite having sufficient language skills for good communication, being the only non-native speaker in a committee meeting for instance can be challenging. Writing research proposals

in a foreign language and the proposals being reviewed by native speakers feels like a disadvantage. Moreover, probably well-intended remarks on a “charming accent” do not feel like a compliment.

During my time as a professor in Germany, I have been directly involved in the university’s “gender and diversity activities” and have first-hand experience with different measures taken to increase women’s representation on various levels in academia. Such measures for instance involved mentoring programs for young researchers to fix the “leaky pipeline,” establishing day care options to support families, and several initiatives to increase the number of women as senior scientists in permanent positions and as professors (including proactive recruiting).

Not all of these well-meaning measures have had only positive outcomes, and some may even lead to unexpected disadvantages for minorities. As an example: When women are recruited as professors in a faculty with very few female colleagues, they may be overloaded with extra work by the requirement to include a certain number of female professors on various committees. As such, a certain degree of diversity in committees is well-justified, but it should not come at the cost of reducing the available time of female professors for the academic core activities, namely research and teaching—especially as the latter activities are more highly valued in assessing academic performance than is involvement in academic self-government. The easiest remedy for such challenges would be, of course, simply to hire more female professors—but that is an oversimplification of these issues.

To summarize, having lived for long periods of time in three different countries (Finland, Switzerland, and Germany) and for shorter research stays of 3 to 12 months outside of Europe (namely in the United States, Canada, and Japan), has given me many insights into the value of diversity.

Changes Observed – From a 30-Year Perspective

Apart from my everyday working life at universities, where over more than 30 years the number of female students in many engineering disciplines has grown significantly, and a steady—albeit much slower—increase in the number of female professors is visible, I have also observed changes through frequent and regular attendance at international conferences, such as the meetings of The Electrochemical Society.

In my experience at the universities where I have worked, the leaky pipeline is still clearly observable. Even in disciplines where there is a strong over-representation of female students up through the graduate level, this seldom is directly mirrored on the faculty position level. However, as a very personal observation: joining the faculty of engineering in my current affiliation in 2003, I was the second female professor in the faculty—hence only two of the five departments in the faculty had a female professor. Today, all our departments have at least one female professor. But this is not a great success story, as

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the timeframe for this change is almost 20 years and the numbers are still quite low.

In my very first ECS Fall Meeting in Chicago in 1988, I did not personally know a single person present. Observing the crowds, it was clear that I was not a stereotypical attendant, neither by age nor by gender. I do not have hard numbers to prove my case, but at current conferences just looking around in a lecture hall, during poster sessions, or at evening receptions, it is clear that the attendance is significantly more diverse than 30 years ago—and not only as it concerns gender. It should not only be every scientist's right to attend, but also much more importantly: science clearly profits from participation of as many researchers from various backgrounds as possible. From a simple personal view: it is much more interesting to mingle in a diverse group than among a uniform set.

Moreover, and also a personal view: already at my first attendance at international conferences it was great to experience the lively interactions between researchers from many different countries, and not being “the one” with the “special” accent.

However, it is not merely the number of people from diverse backgrounds being part of a faculty or being a member of a professional society that is important. Of course, diversity should be also represented in important positions in these institutions. In The Electrochemical Society, for example, even without hard facts and figures, it seems that nowadays leadership in the society, in its divisions and sections, is more diverse. Such a large and prestigious professional society can therefore be a role model on integration of scientists of diverse backgrounds into all levels of activities.

Although women generally seem to be well represented in ECS activities, it seems that women are under-represented as award winners; this is not an ECS-specific case. The origin of this underrepresentation is not clear to me: are we in general more prone to consider male colleagues as candidates for prestigious awards and forget that there may be a well-qualified female candidate available as well? Do women not self-nominate to the same extent as males? Or should we proactively search for female candidates to be nominated? Of course, gender should not be more important than qualification when choosing award winners and as such I do not recommend quotas for women for awards. Moreover, I am not convinced that establishing special awards only for women is the right way to go. This is simply because women want to compete for the same and best awards as all scientists and not be rewarded with an award that may feel like a consolation prize.

The Value of Diversity in Science

It is generally acknowledged that diverse teams are stronger. This increased strength is easily demonstrated in research: If all research group members have the same educational background, they often have the same tendency to interpret results in the conventional way that they learned coming from the same school—out-of-the-box thinking, alternative interpretations, and “unusual” ideas are missing. As already mentioned, early on I learned for myself that the best way to boost my research is to introduce some changes into my working environment; for instance, to go to another institution to learn new methods and meet new colleagues, observe how others tackle research questions, discuss ideas with people with different backgrounds or from different disciplines. Unusual questions may lead to new ideas. Working at a university allows one to remain flexible. It is a place where research group compositions are quite dynamic (frequent changes as students come and go) and often highly international. Leading diverse teams can occasionally be challenging, but in most cases welcoming diversity will be rewarding.

Therefore, diversity has clear merit for progress in science. Academia, on the other hand, can help by promoting diverse working environments. As concerns internationality, this already is the case, as mobility is often considered an important asset in a researcher's CV—this is the case at least at universities I am familiar with. Therefore, research groups at the level of PhD students and postdocs typically are highly international. How far this internationality is directly

translated into higher-level (permanent) academic positions seems to vary greatly between different countries (and between individual universities and research institutions in a single country).

Remaining Challenges

How to Fix the Leaky Pipeline?

In spite of a strong increase in diversity and especially in the number of women in science and engineering from students to postdocs, the number of women with permanent positions, including professors, is increasing much more slowly. Nevertheless, any woman in a leadership position can play an important role in inspiring and encouraging the younger generation to pursue an academic career. Role models demonstrating that life and work can be balanced are especially important for women, even though a life/work balance should be welcome also for men. Of course, in mentoring the next generation of researchers, not only the positive but also the challenging aspects of an academic career should be realistically discussed.

Clearly, the boundary conditions to enable family-friendly research careers need to be set at a sufficient level. Not only are day-care options essential, but also tolerating unusual and flexible working hours may help to combine work and family.

In recruiting for faculty positions, an understanding of unusual career paths is required. Fixed standard criteria (or expectations) for evaluation of a candidate's performance and qualifications may put at a disadvantage a candidate who could not, for example, carry out that expected “two-years postdoc abroad.” There may be personal reasons for this, but it is also important to emphasize that the selection committee should not inquire into the private life of a candidate (this should be self-evident, and required by standard HR practices, but in my experience search committees often ignore this).

Formal Measures vs. Self-driven Measures

It seems that today universities (and other working places), at least those that I am aware of, have established a wide range of policies and measures for promoting equality and diversity. However, such formal measures are insufficient, if they are only established to fulfill expected behavior or governmental requirements. These measures should be established by an institution's self-initiative and not due to political pressure. The self-motivation should stem from the firm belief that it is worthwhile and beneficial to promote diversity in view of achieving excellence in research.

In my experience there is little open and direct discrimination, and it hardly would be tolerated. Unconscious bias is much more difficult to fight against, and the least we can all do is to check our very own biases (from my own experience I can tell that results of a simple bias test can be surprising and eye-opening).

Support Programs for Women and/or Members of Marginalized Communities

Personally, I am not in favor of quotas for women for specific positions, awards, and similar areas. Because the natural increase in numbers of women in leadership positions seems very slow, it is understandable to consider more rigorous measures. This approach, however, may come at a cost of stigmatization for being considered less qualified.

Proactive recruiting may be helpful to increase the diversity of candidates. However, it should be clear (but it seems it is not always the case) that only candidates who fulfill the expected criteria should be considered (instead of being a fake exercise). Positions should be advertised as broadly as possible, as this increases the possibility of inclusion of people from underrepresented groups in the candidate pool.

Many universities have established special support activities for female researchers, such as mentoring programs for PhD students and postdocs. While such measures can be valuable in addressing specific gender-related challenges and are targeted to fix the leaky pipeline, in my opinion women-only support programs need to be carefully considered. A disadvantage of such efforts is that mentoring programs

that are only for women may evoke ideas that women are weaker and require special support to make their way in academia, or that women are preferentially treated. Both have negative consequences for acceptance of women as equal colleagues.

Concluding Remarks

A career in science and research leads one to believe in the value and benefits of promoting diversity. In addition to the self-evident fact that any individual should not be discriminated against, science can greatly benefit from diversity in research teams.

My personal wish for the future is that we will at some point reach a situation where gender, background, disability, or other characteristics do not play any role at all when evaluating the professional qualifications and academic performance of a person. Neither women nor men should be either favored or discriminated against. The person as a whole (scholarship, personality) should be the key to the evaluation of qualification, and not whether the person carries a certain diversity dimension. However, stereotyped performance evaluation should be avoided and tolerance and understanding of different types of career paths should be developed. This appraisal does not come at a cost of accepting a low performance, if performance evaluation is made on a sufficiently broad basis.

Finally, looking back on my own journey, I can certainly state that for my professional and personal life, living and working in different countries has made me much more tolerant in accepting different ways of dealing with things, but most importantly, it has made my life much more interesting—and more diverse. ■

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About the Author



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We asked student and early-career ECS members to share their experiences with diversity, equity, and inclusion in science.



KRISHNAKANTH SADA

PhD Candidate, Indian Institute of Science, Bengaluru

My Diversity Story

Q: How have you been cared for by a mentor or colleague?

I am always grateful to my mentor, Prof. **Prabeer Barpanda**, without whom it might not have been possible for me to successfully ride the journey of my doctoral studies. I remember these three vectors (technical, interpersonal, and communication) from him on how to manage oneself, which have influenced and helped to improve my confidence. His giving me endless freedom and support to carry out my research work has allowed me to think without stress. It resulted in a beautiful story of “versatile battery cathodes.”

Q: What resources have been most helpful to you as you progress through your education/early career?

From childhood, I have admired the Indian national youth icon “Swamy Vivekananda (Arise! Awake! Stop not, till the goal is reached!)” as a source of motivation to strengthen my thoughts. He advocates building an attitude of accepting challenges and fighting for solutions to overcome difficulties. He has instilled in me a belief in TRUTH.

Q: Has receiving an ECS Award or recognition opened a door for you?

Yes, receiving the E. G. Weston Summer Research Fellowship introduced me to the world of The Electrochemical Society and its leaders. It has become a bridge for me to form a diverse research network on electrochemistry.

Q: Do you have any advice for other early-career engineers, especially engineers from historically underrepresented communities?

It is all about how realistic imagination results in creative thoughts. I believe nothing is impossible as long as we keep our motivation alive. Our inferiority complex is the first enemy to overcome. I always remember the quote from Michael Faraday, “But still try, for who knows what is possible?” ■