

**Capnote Comments on “Building Diversity in Higher Education”**  
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**West Virginia EPSCoR**  
**Building Diversity in Higher Education**  
Strategies for Broadening Participation in the Sciences and Engineering  
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Good afternoon. My sincere thanks to Paul Hill, Ginny Painter and the West Virginia EPSCoR contingent for organizing this event and inviting me to speak today. It’s a great pleasure to be here with all of you, and I must say first that I have just spent a very interesting and challenging two days listening and learning.

We started yesterday with the meaning of diversity – as we heard from Beverly Hartline it encompasses a number of things:

- a. ***Geographical diversity*** (and of course that’s a major EPSCoR focus)
- b. ***Institutional diversity*** (in higher education alone we must consider PhD-granting, 4-year colleges, 2-year colleges, community colleges, women’s colleges, MSIs, HBCUs, HSIs, Tribal Colleges, colleges for people with disabilities, and more!)
- c. ***Demographic diversity*** (people from under-represented groups in S&E, ethnic background, gender, age, economic status, people with disabilities, national origin ....). By the way I was surprised and delighted at this meeting to see that people with disabilities are fully on the radar screen – that needs to happen.

All of this involves the conscious or unconscious biases that every one of us brings to the table.

That’s a LOT of ground to cover. Should we care? You bet we should!! We heard why over the past day and a half. I want to underline that with a couple of quotes from people a lot wiser than I am:

First, Shirley Ann Jackson, President of Rensselaer Polytechnic  
(quote)

*That we assure continued national capacity in science and engineering ... is an issue of self-interest, an issue of national self-interest, indeed, of national security.*

*If we engage the talent — with its beauty and the beautiful minds — of all of our young people in science and engineering studies and professions — we will address our national self-interest. And, we will have acknowledged the value inherent in talent and inherent in diversity.*

Second, Arden Bement, Director of NSF (quote)

*We need to be on the leading edge of innovations to increase the participation of under-represented groups. We need to address this with the same energy and focus we have used to innovate and advance our disciplines and fields. We at NSF need to hear your ideas so we can work together.*

Third, Joseph DeSimone, Professor of Chemical Engineering, NC State University (quote)

*Diversity Drives Innovation!*

and

*You can do all the innovating you want in the laboratory, but if you can't get it out of the university walls you do no one any good.*

I think Joe DeSimone is on to something. He's the founding director of NC State's Science and Technology Center on Environmentally Responsible Solvents and processing, and he won the \$500K MIT-Lemelson prize this year (quote) "for his pioneering inventions, lab-to-market entrepreneurship and commitment to mentorship."

In other words, as we heard repeatedly at this meeting, advancing and ensuring diversity in science, mathematics, engineering and technology isn't just a "moral imperative", it's a matter of self-interest and national interest. It's critical to the future economic health and strength of our society, and quite possibly for the rest of the world as well.

So how are we doing?

The picture is mixed at best, and in many ways there's a whole lot to worry about. You heard a whole lot of statistics over the last day and half, so I'll just briefly highlight some examples here:

**First example:** women earned more than half of all bachelor's degrees and S&E bachelor's degrees in 2005, but major variations persist among fields:

- Women earned more than half of bachelor's degrees in psychology (78%), agricultural sciences (51%), biological sciences (62%), chemistry (52%), and social sciences (54%).
- Men earned the vast majority of bachelor's degrees awarded in engineering (80%), computer sciences (78%), and physics (79%).

And we know that the representation of women among science and engineering faculty at most research universities – particularly at the senior levels - is still extremely low. We also heard from Mary O'Connell what can be done to change things at the faculty level. I liked what Mary said to us: “What you really need to do is *WHAT WE DID*” – organize your faculty retreat (preferably somewhere nice in New Mexico) and *GET TO WORK*.

**Second example:** we heard that blacks, Hispanics, and other ethnic minorities (including American Indians/Alaska Natives) together constitute 24% of the total U.S. population, 13% of all college graduates, and just 10% of the college-educated in S&E occupations. Today the combined numbers of women and minority men in science and engineering, compared with their numbers in the general population, make up what Shirley Ann Jackson calls the “under-represented majority”. And there is a seismic demographic shift under way in the US – by 2050 blacks, Hispanics and other ethnic minorities will make up over 50% of the college-age population - a “majority of minorities”. This is surely a major challenge for higher education in science and engineering.

**Third example:** the 27 EPSCoR jurisdictions represent 20% of the US population but receive about 10% of NSF research funding each year.

**Fourth example:** Molly Carnes responding to a question from Mark Leddy yesterday said that if we are years behind in bringing women and minorities into the STEM enterprise, we are decades behind when it comes to people with disabilities. And the statistics Mark Leddy gave us this morning are startling: people with disabilities make up 16% of the US population (and that could be an underestimate), 11 to 12% of high school students, only 7% of STEM college students, and just 1% of Ph.D. recipients. That's the ultimate leaky pipeline.

Of course, these challenges aren't exactly new. Ed Galindo gave us a wonderful example yesterday of a failed attempt at educational partnership, from 1774 no less, when Native Americans rejected an offer from the gentlemen of Virginia to enroll "native sons" in the College of William and Mary with this response:

"Our experiences are not the same as yours..." and then invited the *young* gentlemen of Virginia to join *them* in the great outdoors.

I think Ed's story tells us that a partnership has to offer benefits and gains to *BOTH* sides!

We heard Dr. Pat Galloway speak eloquently last night about the critical need to *change the face* of science and engineering. In her book "The 21<sup>st</sup> Century Engineer" Pat refers to the work of the Committee on the Advancement of Women and Minorities in Science, Engineering and Technological Development. The Committee was established by Congress in 1998. She quotes from the Committee's report as follows:

*"Today's US economy depends more than ever on the talents of skilled, high-tech workers. To sustain America's pre-eminence we must take drastic steps to develop our workforce. An increasingly large proportion of the workforce consists of women, under-represented minorities, and persons with disabilities –groups not well-represented in science, engineering and technology fields. Unless the SET labor market becomes more representative of the general US workforce, the nation may likely face sever shortages in SET workers..."*

Does this sound familiar? Dr. Galloway's quote from the report continues:

*"If...the United States continues failing to prepare citizens from all population groups in the new, technology-driven economy, our nation will risk losing its intellectual and economic pre-eminence. It is time to move beyond a mere description of the problem toward implementation of a national agenda that will take us where must go...It is also time to establish clear lines of responsibility and to define effective accountability mechanisms."*

Dr. Galloway points out that little has been done to act on these recommendations since they were published in the year 2000. I have to agree.

Certainly we have seen the problem and the challenges re-stated with increasing urgency. In 2003 the National Science Board published a report entitled “The Science and Engineering Workforce – Realizing America’s Potential”. In its executive summary, the report states that (quote) “The future strength of the US S&E workforce is imperiled by two long-term trends”:

- *Global competition for S&E talent is intensifying, such that the United States may not be able to rely on the international S&E labor market to fill unmet skill needs.*
- *The number of native-born S&E graduates entering the workforce is likely to decline unless the Nation intervenes to improve success in educating S&E students from all demographic groups, especially those that have been under-represented in S&E careers”.*

NSF’s Strategic Plan - published in 2006 - also emphasizes the imperative of broadening participation in S&E, identifying it as one of NSF’s core values. And we have seen national attention to these challenges through the Rising Above the Gathering Storm report, the American Competitiveness Initiative, and the America Competes Act.

So?

Do we have anything to show for all this attention? I want to mention some NSF data and activities that may help to define the challenge of broadening participation and increasing diversity in S&E.

With respect to NSF support for under-represented groups, as Bev Hartline told us, the good news is that the number of awards to women and under-represented minorities has been rising – slowly but steadily - over the past 10 years or so. In 2008 there were at least 2560 awards to women and at least 370 awards to under-represented minorities. (“At least” because not everyone reports gender or ethnic background to us). I don’t think there are reliable numbers on the number of awards going to people with disabilities, but Mark Leddy may know better...

The bad news of course is that awards to people from under-represented groups still only represent a small fraction of the total number of NSF awards. About 24% of all new awards went to women in 2008, and only about 6% to under-represented minorities. These percentages have been increasing, but only slowly (20% and 4% in the year 2000) - we still have a long way to go.

NSF is moving to address these challenges, as you heard from Fae Korsmo. First, every NSF proposal *must* address the broader impacts of the work proposed. If you don't do that, your proposal won't get far. Second, we are assessing our efforts at broadening participation and planning where to go from here. In August this year, NSF released the report of an internal working group on Broadening Participation at NSF subtitled "A Framework for Action". The report is posted on the NSF web page. It makes seven specific recommendations to broaden participation. These include actions to broaden the pool of reviewers, train NSF staff and better inform reviewers and panelists, ensure accountability for NSF staff and principal investigators, communicate guidance and promising practices, and maintain a portfolio of relevant programs.

You can find the listing of NSF programs aimed at broadening participation on our web page, with links that describe the programs in more detail. There are 30 programs on the list. They range from NSF-wide efforts such as ADVANCE; the Tribal Colleges and Universities Program (TCUP); Facilitation Awards for Scientists and Engineers with Disabilities; and the CREST program for Centers of Excellence at MSI's; to programs aimed at specific disciplines such as Broadening Participation in the Biological Sciences, Broadening Participation in Computing, and Partnerships for Research and Education in Materials (PREM). And of course EPSCoR's Research Infrastructure Improvement program is included.

Let me close with some comments about EPSCoR.

Early in 2006, NSF's Deputy Director Kathie Olsen asked for a 'bottoms-up' approach from the community to help develop a new vision for EPSCoR. The EPSCoR 2020 workshop held later that year was a first step in that direction. I quoted briefly from the 2020 workshop already:

- These 27 jurisdictions comprise 20% of the US population
- They include 25% of the research/doctoral institutions nationwide

- and 18% of the scientists and engineers in the national workforce
- Yet they receive only about 10% of NSF research funding! Again this is an improvement over 10 years ago – the trend is the right direction – but there’s still a long way to go.

The 2020 workshop report identifies 6 strategic priorities to move EPSCoR forward. How has NSF responded?

Priority 1. More flexible Research Infrastructure Improvement awards.

*NSF has increased RII award amounts from a maximum of \$9M for 3 years to \$20M for 5 years.*

Priority 2. Relocate EPSCoR within NSF to maximize research focus and cross-directorate interactions.

*Last year EPSCoR was relocated to the Office of Integrative activities in the Director’s Office – providing higher visibility across NSF and ensuring that EPSCoR is not perceived as the stepchild of any particular Directorate. And it underlines that EPSCoR has the full attention of the Director and Deputy Director.*

Priority 3. Revitalize and extend other components of EPSCoR.

*Under Henry Blount’s leadership, NSF has launched the competition for RII ‘Track 2’ awards; and Henry is exploring partnerships between EPSCoR and NSF’s Office of Cyberinfrastructure and Directorate for Education and Human Resources.*

Priority 4. Restore the focus on “E” for Experimental in the program title.

*Again, building on the EPSCoR CI workshop last fall in Kentucky, the RII Track 2 competition sets up a great opportunity for CI networking among EPSCoR jurisdictions, both regionally and topically.*

Priority 5. Develop ‘state strategic S&T business plans’ for state EPSCoR programs, and develop plans that fully integrate NSF-EPSCoR into the process.

*This is now part of the requirements for RII Track 1 awards – and from what I have seen personally so far it’s proceeding very well.*

Finally, Priority 6 calls for the creation of a shared understanding and definition of success (including metrics for educational and economic outcomes).

***This is clearly a work in progress. It's critically important, and there are no easy answers. We have to work on it together – “we” being the NSF EPSCoR program and you, the EPSCoR community.***

***We can certainly identify at least one critically important measure of success, however.*** That will be the extent to which we increase the diversity – the geographical, institutional, and demographic diversity - of the academic STEM community and, ultimately, the STEM workforce. There are plenty of immediate opportunities for EPSCoR there. For example - Beverly Hartline reminded us yesterday that half the HBCUs, a third of the HSIs and two-thirds of the Tribal Colleges are located in EPSCoR states. That's a challenge and an opportunity! And this morning, Mark Leddy strongly encouraged EPSCoR states to compete for *Alliances for Students with Disabilities*.

Yesterday, Bev Hartline told us about Frances Cornford's ironic proof that “Nothing should ever be done for the first time”. In other words, take no risks! But Dr. Hartline reminded us – and both Calvin Mackie and Laureen Summers told us loud and clear - that ***we have to go out and take risks beyond our own comfort zones.*** It's up to each one of us to ask **“what changes can I make”?**

I haven't said anything about the economic outlook or the NSF budget. May we live in interesting times! Rosina Becerra reminded us that when resources are scarce, when times are tough, when something has to be given up, DIVERSITY is often the first thing to be sacrificed. It will take leadership to prevent that – leadership from every person in this room. I firmly believe that the attention focused on these challenges here over the past two days will help to move us in the right direction. We have lots of great tools and great ideas to take home with us.

Thank you!