

SUMMARY of MEETING

Date: May 11, 2009

Place: National Science Foundation
Division of Undergraduate Education

Organized by: Catherine Fry
Mel George
Susan Millar



Purpose and goals: This meeting brought together people representing higher education organizations and professional societies who shared a commitment both to improving STEM education and to ensuring the long-term well-being of our planet and its inhabitants. The goals of the meeting were (1) To acquaint those assembled with the Mobilizing STEM Project and (2) To hear about the current activities of those represented with an eye to identifying ways in which we all could better act in synergy.

Attendees: See Appendix A.

“A very thoughtful ... and a very busy group of people attended.”

Meeting format: Two 2.5-hour sessions were held with identical formats, one in the morning and one in the afternoon. Each session opened with remarks to all by Mel George, Susan Millar, and Myles Boylan. People then split into three sub-groups for sharing and discussion. In organizing the sub-groups, care was taken to maximize the diversity of the participants by mixing representatives of disciplinary professional societies, university and college organizations, and other stakeholders. Each sub-group had a facilitator and a recorder. The groups reassembled and the reporters from each group spoke briefly. Mel George and Susan Millar closed the meeting.

Readings distributed prior to the meeting:

- 1) The project synopsis
<http://mobilizingstem.wceruw.org/documents/projDescript.html>
- 2) A statement of the project vision
- 3) A list of the people involved: Critical Advisors, Mobilizing STEM group, and the NRC “companion project” group

Web page: <http://mobilizingstem.wceruw.org/nsf09.html>

*“Although we are unlikely to agree on any single item,
we have one thing in common: The planet.”*

- prepared by Cathy Middlecamp, May 15, 2009

Common Themes that Emerged from the Discussions

The items in this list were distilled from the notes taken by the meeting recorders. Many of these are direct quotes from participants. As we did not have time to obtain permission to quote individuals, no speakers are identified.

1. We share a sense of urgency.

- Time is running short. The time to act is now.
- Our initiatives are driven by a real problem that is not going to go away.
- We cannot afford to let this slide for too long.
- We cannot ignore the opportunity to educate all of our graduates in sustainability.
- The urgency of the problems is becoming very clear: The quality of air, the water, and the effect of climate change. Folks need to have a grasp on these kinds of issues, as they will be the issues of the future.
- Students are not learning now what they need to know.

2. We are not acting alone.

- Rather, we believe we are catching a wave.
- The time for our concerted actions is now.
- We recognize that there is something afoot in our nation (and world)!
- If we can get an alliance going when there already is a lot of convergent thinking, then we can do something.
- Leadership is everywhere, although the leaders may not be labeled so you can find them.

3. Everybody has something to contribute.

- People are in this room because they each have a role to play.
- This is a conscious effort to move forward and to help one another.
- It takes a village. Nobody can do all of the work, but each one of us can do some of it.
- We need to do this collectively, it is too much for an individual.
- A conscious parallelism of action, convergence, alignment
- We can engage in a process of mutual reinforcement. Everybody has something to learn

4. “Layer it on.”

- Talk to your colleagues in your organization. Do spade work at home.
- Brainstorm how these ideas might be *layered* into what you are doing.
- Embed. Figure out what you can do in your world.
- Each one of us has potential to do something that affects the system.

5. What we are about is not a new movement.

- Two movements preexist: the STEM reform movement and the environmental movement
- We now have a confluence, the coming together of these two. Convergence.
- We don't have to wait around for a group with a certain name.
- Lots of things are already happening; work is in progress.
- Our work today builds on prior work. Cast our current work in broad terms, so as to allow people whose prior work was significant to know that their work is respected and listened to.

6. Our past efforts have not fully succeeded.

- We all have been through this before. We are so good at creating points of light and they shine with an intensity for a brief period of time. Then they go out if the funding goes away.
- The net effect has been pretty minimal.
- How do we sustain the action? We have to find the balance between the grass roots efforts that lead to the points of life and the national leadership.
- Evidence by itself has not been sufficient to catalyze change.
- “I feel like I’ve been around this table for a long time.”
- We do not want to write yet one more report.

7. Networking is critical for our success.

- Networks. Not be thinking that there is one network that solves this problem.
- Multiple networks. Each one has a particular purpose.

8. Systems thinking is critical as well.

- Look at this from a systemic point of view.
- We are too busy to think systemically, ...
- What we are trying to do is to change a system, our educational system.
- We look for the leverage points.
- Given what we are talking about, it would be wonderful if there were money. But we are committed to making this kind of change whether there is money or not. There needs to be a shifting of priorities.

9. Focus on solutions.

- Scientists measure things. But they do not necessarily focus on *fixing* things. What will be more compelling for college students is how you fix things. In this regard, the engineers do have a foot in the door.
- Environmental science education is focused on problems. Sustainability education is focused on solutions.

10. Students and young people! Involve them.

- Students are our future elected officials (and more importantly, their staffers).
- Generate students who are boundary crossing agents.
- Build young leadership, sustain it, allow it to be rewarded.
- Be sure to do this in the disciplinary organizations.
- The young scientists need to have the backup of the older generations, as we don’t want to endanger our younger people.
- Engage and convey the mantle to a younger set, to younger scientists. Cultivate these people.

11. Involve the general public and our elected officials.

- We have to reach beyond colleges and universities.
- Questions: How do we reach the general public? How are we going to engage people where they are? How do we get this message out to the broader public?
- We need support from the general public to develop and build this village.
- We need to engage our public officials as well: State legislators, local school boards, elected national officials, state boards of higher education.

- Improving STEM education is one thing. But with AP courses, students can get through with no college and math courses.
- The audience that has to get the word is not necessarily reached by undergraduate education.

12. Involve Community Colleges.

- The community colleges are agents of change, as they are much more agile.
- An increasing number of undergraduates are there and will take science and math there.
- How we affect the most students – most of this is in the introductory courses.

Broader Issues Discussed that Relate to Sustainability

Sustainability (general comments)

- Sustainability is a good way to link the disciplines and to bring science and math into better alignment.
- Understand that sustainability is insidious, applies to everything across the board. It is a dimension of everything. It affects people's bottom line.
- Sustainability can be interpreted in many ways, both positively and negatively. Could be a subject to engage engineers with the rest of the faculty on campuses.
- Sustainability is overtly on the radar screens of some; covertly for others.
- For some of us, sustainability is the means; for others it is an end. Many of us sit not only with means or ends, but also in a middle pathway of people who move in and out. It is important to think about both the means and ends approaches to sustainability. A movement can encompass both and this is why many individuals and groups can become involved.
- My concern is that sustainability education can be too influenced by politics. We need to focus on "What would I do?" and "How do I know that?"
- The *How-would-you-know-this-is-true* idea has been frequently used as a guiding principle for sustainability education.
- Sustainability as a movement can have that political cast; sustainability education rarely has that.
- Sustainability is *more* than sustaining the physical environment. It also must include social dynamics and human relationships.
- A difficulty was named with the term itself: sustainability. Some interpret it as "How do we sustain our current lifestyle." Similarly, those in programs ask "How do we sustain our program?"
- There is a need to at least be able to communicate effectively across different groups of people.

Sustainability & Existing Courses

- Part of what I began to see in Atlanta is that it has largely focused on establishing discrete courses and discrete areas of study and trying to get more of them. This is myopic and probably futile, especially in K12
- Both philosophically and practically, we need to infuse sustainability thinking into a number of disciplines and subject areas. That is the arena we are ultimately going to make a difference.

Sustainability & Competitiveness

- Sustainability and competitiveness are linked. The nation that links these two will be the nation that leads. The shelf-life of the word "competitive" was short.
- Competitiveness – older folks talking to younger folks
- Sustainability – younger folks talking to older folks.
- As a result of listening to this today, an era of focusing on competitiveness as a motivating force needs to be supplemented by the notion of sustainability. I am

somebody who is going to go back and look at my organization with somewhat different eyes.

Sustainability, Disciplines & Disciplinary Societies

- If you want to get an issue in play, get it connected where scientists will go – to the disciplinary society.
- Not only can we engage students, but also we can link disciplines.
- Life is not parsed the way the curriculum is.
- We got into a discussion of what it will take for professional societies to be involved. They don't have to worry about tenure rules on campus. On the other hand, they are supposed to be convincing people in their fields that their organization is the one to pay their dues to.
- It becomes difficult to collaborate, as you try to think about territory and working together about the broader issues.
- Professional societies are the keepers of their fields and thus can help colleagues understand emerging connections and new developments.
- Attention to disciplines is important because they really do turn people off. We are stuck with them.
- Disciplines were inventions of the land grant universities. You don't wander around the island of Crete and find Departments of Anthropology.
- Professional societies need to work more closely together to share information, to provide common messages and tools for members, and to learn from each other as well as to approach teaching and learning from an evidentiary basis.

Sustainability, Teacher Preparation & the Curriculum

- The major R1's have not been stepping up to the plate in producing math and science teachers.
- The need/opportunity is great. A case in point is physics teachers, as 0-1 teachers graduate per school per year.
- There is a lack of sustainability in teacher education. Also in the physical sciences, engineering, business and the health sciences.
- If it is in the curriculum, it tends to be in the margins of the textbook. If it is in the curriculum, it tends to be for non-science majors.
- It is no longer about what's "nice" for kids to learn and know how to do. It's what do they *need* to know – they need to be prepared for college, or for high skills training for work right after high school, and to be able to flourish in the civic sphere.
- Dismaying finding: while the campuses are going green, sustainability is not found in the curriculum

APPENDIX A**Morning Session (9:00 a.m. - 11:30 a.m.)****Participants Representing Organizations and Professional Societies**

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Afternoon Session (1:30 p.m. - 4:00 p.m.)

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Mobilizing STEM Education for a Sustainable Future

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