LEADERSHIP IN DISSEMINATION AND INNOVATION TOWARD *STEM* REFORM

Leadership in disseminating ideas about reforms and about the process of reform, leadership toward maintaining creativity in a time of change for undergraduate science and mathematics education are issues that have been at the very heart of Project Kaleidoscope since the beginning and that shape the emerging partnership with AAC&U. These are issues critical to the strength of the undergraduate science and mathematics community into the 21st century and to the broader community of stakeholders.

Leadership is present where we find people working together believing their cooperative efforts will lead to improvements in the system for everyone, will lead to systemic change that will ultimately affect the quality and character of student learning. *Where leadership is present, we find people working together because they believe their collective actions will be capitalized and leveraged for the greater good, and the results of their collaborating can and will be sustained.*

Let us consider the role of leadership in building communities of interest in undergraduate science and mathematics, communities where people become deeply:

- committed to working on a particular problem and bringing about change
- engaged in solving a local problem by taking a novel idea, exploiting the idiosyncratic features of their community
- involved in reform because of their commitment to their students, their field and their institution, and indeed, for their own intellectual pleasure.

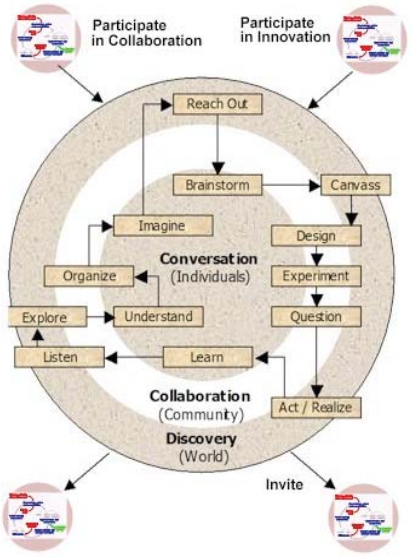
These communities of interest could be within an individual department or institution, or a national STEM professional society or educational association. Let us assume, for the purpose of argument, that leaders must understand the theory and practice of dissemination, and that it is as creation. Dissemination has to deal ideas and process just as innovation does. These would be leaders who recognize that for every hard problem there is a *beautiful solution* somewhere and that solving problems locally is not hard, efficient, cost-effective or sustainable.

We need leaders who ask:

- "How do we link local solutions to national problems and national problems to local solutions?"
- "What can we learn from those who have solved particular problems in particular environments to advance the process of reform within the communities of which we are a part—communities within disciplinary/ interdisciplinary fields, individual departments and at the campus level?"
- "Where are the venues for sharing and communicating best practices and lessons learned about adaptable innovations?"

This essay is adapted from a presentation by **P. Uri Treisman, The University of Texas at Austin**, to the first Project Kaleidoscope Leadership Committee, July 1993. — Adapted by Jeanne L. Narum

For full essay, see: *http://www.pkal.org/documents/UriTreismanPresentationInSTEM.cfm*



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Such leaders understand the power and potential of communities to advance and inform exploration, adaptation and assessment of best practices in STEM reform efforts. They know that the isolated agent of change cannot single-handedly overcome the curricular, political or structural impediments to reform. They also know that people work on what they care about deeply, and that it is the challenge to leaders is to capitalize on and leverage such individual commitments for the greater good.

Neither ideas nor innovations alone are enough. It is the community who realizes the ideas, who reinterprets them, who make things work.

In this constrained fiscal environment, dissemination and adaptation of best practices and lessons learned within larger community needs to become the modus operandi. Further, change will need to happen by substitution rather than change by accretion. The challenge to leaders is to negotiate this substitution by bringing *beautiful solutions* developed elsewhere to the table for examination, adaptation and assessment.

The challenge is to understand the politics of getting people to collaborate in the processes of innovation and dissemination, particularly in a time of budgetary crisis, and of decreasing public support for what we do.

The dissemination challenge is as real for national disciplinary, professional and educational societies as it is for individual campuses. Ultimately, for our nation to achieve the urgently-needed transformation of the undergraduate STEM learning environment, everyone has to be *working together because they believe their collective actions will be capitalized and leveraged for the greater good, and the results of their collaborating can and will be sustained.*

The success of any dissemination effort, and thus of any innovation effort, is in defining the collective responsibility for efforts designed to realize systematic, systemic and sustainable transformation of the undergraduate STEM learning environment.

Neither ideas nor innovations alone are enough. It is the community who realizes the ideas, who reinterprets them, who make things work. The success of reform is two parts ideas and five parts people. This is as true for the success of dissemination regionally and nationally as it is for reform efforts on a single campus.

Further, the dissemination effort must have a vision, goals and strategies—all tied to a plan of action—just as does an innovation initiative. Everyone involved in dissemination must care as deeply about such an effort as do those involved with innovation. Leaders in dissemination and innovation alike must have a clear sense of the context for their work and a clear vision of what is possible—no matter their sphere of responsibility.

Those who will be leaders in dissemination must learn how to run around and make connections, develop intuitions and bench-marks for understanding. They must be open to new and uncomforting ideas, to examining persisting perceptions about students and learning and teaching and research. They must understand the over-arching meaning of their work as leaders.

We should not underestimate the power and significance of the commitment to make a difference on a single campus; it will take this same commitment and passion about the work to build a national community of interest committed to making a difference for the undergraduate science and mathematics community in this country.

The potential of communities and networks (real-time and virtual) was barely on the radar screen in 1989 at the beginning of PKAL. We are beginning to know what works in shaping communities of stakeholders with a shared vision of robust learning in STEM fields for undergraduates on our campuses—now and in the future. But it will take a community of communities to make this happen. Keep in touch. ■