Abstract:

This session will present findings from the Boston Science Partnership (BSP) promoting revisions to the tenure and promotion review processes so that their criteria include recognition for science education scholarly and outreach activities. Such activities include grant writing to support work or research in K-12 settings, submission of publications in science education journals, and work with K-12 teachers, among others. Our efforts over five years have aimed at raising the standards for STEM education scholarship to service and teaching activities, in addition to informing the research efforts of STEM faculty. Using case studies of faculty portfolios and a “mock” tenure review meeting, we will raise questions that explore how different institutions categorize faculty activities, reward service and teaching, and advance the process of change.

1. Questions(s) or issue(s) for dialogue at Learning Network Conference session:

Clarity of the Big Picture
- What are the goals for faculty involvement in science education, research, and outreach?
- What are the benefits to K-12 education of greater faculty engagement?
- What are the benefits to faculty members of greater involvement in K-12 education, research, and outreach activities?
- What are the benefits to higher education instruction, leadership, or networking?
- What are the benefits to the University of K-12 outreach activities?

The Review Process
- What are the barriers for faculty inclusion in K-12 education, research, and outreach activities?
- What are the barriers to including recognition for science education work at universities?
- How are K-12 activities categorized in a review file (research, service, or teaching)? How would different institutional cultures categorize different examples?
- How are K-12 education, research, and outreach activities rewarded and acknowledged in higher education institutions?
- What differences in perspective emerge when these activities are included in a review package by a faculty member?
- How is the culture among peers changed to accept and reward science education activities?

Making Change
- What would be tangible “next steps” for your campus?
- What have you tried and what worked and did not, and why?
• What role do individual champions play in initiating and sustaining conversations that lead to change?
• On what levels (individual faculty, departmental, college, university, STEM fields) do changes occur, and how do those changes impact operating principles at other levels?
• What role do administrators (chairs, deans, provosts) play in initiating and sustaining conversations that lead to change?

2. Context of the work within the STEM education literature and within your MSP project:

Engaging faculty in STEM departments in research, teaching or service with K-12 students and teachers has been shown to be a promising vehicle through which to achieve education reform and improvement at both the higher education and K-12 levels, an assertion which is amply supported by prior research (Kirschenbaum & Regan, 2001; Teitel, 1999; Zetlin & MacLeod, 1995). However, barriers to institutional change persist, often driven by outside forces such as economic competition, perceptions of the status of the university and the drive for professional standards which serve to encourage priorities other than teaching and service (Youn and Price, 2009). Despite uncertain formal rewards, faculty continue to engage in work with K-12 students and teachers, often being driven by their own personal beliefs in the value of these activities for themselves, teachers and students or society as a whole (Skerrett & Sevian, 2009). Conversations in formal settings (such as during review committee meetings) and informal settings (ad hoc conversations with faculty) can help make the evaluation criteria as explicit as possible (Filetti, 2009) and stress the importance of engagement with K-12 education. Furthermore, professional development, such as the BSP offers, can lead to greater K-12 involvement (Steinert, 2006).

The BSP has engaged in a variety of informal and formal practices to change the institutional culture of rewards and recognition for service to K-12 research and outreach and to teaching. The model used at the University of Massachusetts Boston (UMass Boston) has consisted of five primary efforts:

• Tenure workshops for junior faculty have been conducted annually in an effort to increase the discussion of STEM education activities and provide examples of how to include these activities in tenure files.
• Meetings about the place of science education reform and work in K-12 science as a component of tenure and promotion review have been held annually with university leadership (Department Chairs and other senior faculty, Deans, Provost). This has sparked interest in expanding the criteria used for tenure and promotion.
• The BSP provided opportunities for faculty to engage in outreach and to learn and practice new teaching strategies that involve active pedagogy. Through many of these opportunities, we modeled data-driven teaching which then informed the conversations about teaching and learning strategies. Faculty report changes in their teaching as well as their thinking about teaching practice based on these experiences.
• Deliberate inclusion by BSP-involved STEM faculty of activities, and discussion of their value, for K-12 outreach, professional development to incorporate STEM education research findings into STEM teaching, and collaboration with K-12 teachers, in Annual Faculty Reports and Tenure and Promotion files. This has led to increased discussion among peer review committees and has initiated cultural (institutional) change.
BSP-involved leaders participated in revision to tenure and promotion criteria within departments in the College of Science and Math.

These activities have existed in the context of the overall project activities. For example, individual conversations among faculty members about the BSP increased participation in BSP activities. As well, many BSP activities included discussion of teaching (such as in preparation for teaching the Contextualized Content Courses) and those discussions and experiences led to changes in faculty members’ university teaching practices. BSP activities often engage STEM faculty alongside K-12 teachers, who are able to model for faculty their reflective and effective pedagogical strategies. Initiated by their respect for these K-12 teachers, faculty begin to own their own reflective practices on teaching, and their value for this grows into how they report on their research, teaching and service. Furthermore, once faculty begin to think in these new ways about teaching, they fold the principles into their own research questions, for example, by pushing harder to find the core understanding that emerges from a research path or to answer the “so what” questions about their research.

Ultimately, what is at issue are the boundaries between the components of the traditional triumvirate: research, teaching and service. When faculty write grant proposals, they draw from and expand their research expertise (these activities are often regarded by universities to be under the research component). When faculty serve on review panels at NSF (generally regarded as a service activity), they bring a scholarly approach to the review process that draws upon and often extends their research expertise. We have argued in the BSP that a scholarly approach to service in the form of research-informed content-based outreach with schools, teachers, and students, crosses the boundaries between research and service. We have advocated and supported faculty in publishing and presenting and to promote acceptance of this work. Similarly, engagement in teaching content-based courses for in-service and pre-service teachers in true collaboration with K-12 teachers as co-instructors, and informed by the research literature in STEM education, crosses the boundaries of all three traditional domains.

3. Claim(s) or hypothesis(es) examined in the work (anticipating that veteran projects will have claims, newer projects will have hypotheses):

The claims that we make through this presentation are supported by existing literature and through experience with the UMass Boston model. There is also a research effort within the BSP that is examining more specifically and rigorously the capacities and barriers to these institutional changes. Researchers from the Education Development Center (EDC) have collected and transcribed interviews with junior and senior faculty, and administrators at all levels within the university. Their analysis from collected data will be completed in late spring, 2010, and we do not report on that in this presentation. Below, we offer claims based on our experience with driving reform at UMass Boston during the past five years. These claims are, in part, informing the analysis of the EDC study.

- It takes three years to change an individual faculty member’s teaching practice.
- Cultural change occurs informally among peer faculty members, but is enhanced when opportunities and experiences for engagement in K-12 research and outreach activities are made available.
- Faculty members are generally open to include high-quality educational activities in the reward system if they understand the impacts of these activities.
- Administrators’ support eases the inclusion of science education activities in tenure and promotion files.
- Examples of successful inclusion of science education activities in tenure and promotion files helps further inclusion of these activities in files.

4. Evaluation and/or research design, data collection and analysis:

The EDC research design has included:
- Interviews of STEM faculty members and university administrators. 2004 - 2009
- Surveys of STEM faculty members and university administrators. 2004-2009
- Observations of STEM faculty classes. 2004 - 2008

Much deliberate strategizing and planning by the BSP leadership team, both formal and informal, has informed the implementation of the four main efforts the BSP has undertaken to advance institutional changes in valuing STEM education reform and K-12 research and outreach. These have served to hone our practices and to provide guiding principles to inform the research analysis.

5. Key insights (retrospective for veteran projects, prospective for newer projects) that have value for the Learning Network:

Our project team considers these institutional changes it has promoted to be among some of the most significant accomplishments of the project. Along the way, we have learned many valuable lessons, some through trial and error, and we collect these here in hopes they can provide some guidance to other MSP projects.

- Institutional change can occur top-down (codified) or bottom-up (peer review). For maximum impact, changes need to occur in both directions.

- Institutional change is slow (several years), starts small and grows non-linearly. Much depends on the dispositions of individual stakeholders, and, when administrations change, or circumstances open up or shut down opportunities for conversations, those who are promoting change must take advantage of these moments.

- Individual champions can make a huge difference by providing an example, initiating dialogue, and demanding excellence. It is important for STEM faculty who are well respected to cast their own data and reflective practices as examples for both levels of stakeholders (“above” and “below”) to discuss and learn from.

- STEM faculty members are open to learning from data and high-quality research, but not necessarily anecdotal evidence. Thus, the examples offered by STEM faculty who are promoting change must be carefully presented with attention to these considerations.
• Increasing vocabulary and formative assessment enhance peer discussion of university and college STEM education. Many STEM faculty value opportunities to practice engaging in reflective practice when they are offered structured protocols that are theory-based and evidence-driven.

• Discussion of work in K-12 education during Tenure and Promotion Review reveals how the institutional culture is changing (or not). The process of change can be studied, formally by researchers and informally by the STEM faculty promoting the changes, by monitoring discussions of Annual Faculty Reports and other personnel committee decision-making processes.

References


