DEVELOPING MULTI-INSTITUTIONAL PARTNERSHIPS FOR SYSTEMIC CHANGE

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INTRODUCTION

The role of science and technology in American society is undergoing dramatic change due to our increasingly technology-oriented society. Systemic reform of education is increasingly recognized as a necessary strategy to meet the changing workforce needs and enhance the diversity and preparation of the nation's scientists, mathematicians, and engineers. As the National Science Foundation (NSF) and other federal agencies place an increased emphasis on effective education and human resources initiatives, a shift from the traditional scenario of individual scientific research to that of interdisciplinary partnerships that incorporate an educational component are becoming the norm.[1] This changing climate among federal funding agencies often requires a different way of thinking about partnerships and innovative collaboration that extends across institutions of higher education, community colleges, and K-12 education to develop comprehensive and coordinated improvements in science, mathematics, engineering, and technology education.

Likewise, research proposals will often be more competitive by expanding the goals of the project to include an educational component. The addition of K-12 educational components to existing research guidelines for proposals can be seen in the NSF's Engineering Research Centers[2], where an associate director for education is now included in project requirements; the NSF Career Grants for young faculty[3] which now lists K-12 and teacher educational initiatives as component, and projects funded by the National Institutes of Health[4]. The increased emphasis on interdisciplinary partnerships and transfer of knowledge to the public is evidenced by statements of agency policy, such as those of Dr. Rita Colwell, Director of the NSF.[5]

STRATEGIES FOR DEVELOPING PARTNERSHIPS & PROPOSALS

Strategic and innovative partnerships may have a national, state or regional emphasis. Examples might include the NSF funded Foundation Coalition project which links seven

institutions from throughout the United States to address the reconfiguration of engineering education into a more integrated form.[6] Similarly, a project in the state of Texas and funded by the Texas General Land Office, the Ph.D. Pipeline program links the master's programs at a historically black university and another minority serving institution with predominant Hispanic enrollment to a doctoral degree program at a major research institution to encourage underrepresented engineering students on to graduate school.[7] The Texas Engineering Experiment Station (TEES) has created a partnership of more than 10 universities throughout Texas to create innovative partnerships focused on K-12 mathematics and science reform. These include the Texas Collaborative for Excellence in Teacher Preparation and the Texas Rural Systemic Initiative, which are both funded as projects by the NSF.

Texas Collaborative for Excellence in Teacher Preparation

The Texas Collaborative for Excellence in Teacher Preparation is a partnership of science, mathematics and education faculty from ten public universities in Texas who are working to improve science and mathematics teacher preparation statewide. The partnership also includes science and mathematics K-12 teachers and others involved in educational reform. This Collaborative recognizes the need for interdisciplinary partnerships in order to bring about systemic improvement of content-specific teaching methodology among faculty in science and mathematics who prepare future teachers.[8]

Texas Rural Systemic Initiative

Texas Rural Systemic Initiative (TRSI) is a five-year project funded by the National Science Foundation focused on improvement of K-12 mathematics and science education in eligible Texas counties. "The mission of the TRSI is to improve and accelerate the performance of all students in mathematics and science and the persistence and course taking patterns of all students in those disciplines. Systemic reform in Texas rural schools will be achieved by linking NSF's Drivers for Systemic Reform with the TRSI Attributes of a Reformed School (J12-13, Drivers/Attributes) and the Texas accountability system (pg. 3). The integrated NSF Systemic Drivers and TRSI Attributes define the daily core of focus for how school districts achieve systemic reform, e.g., changing the way all students are taught, learn, and assessed in the classroom, ensuring all students meet high standards of performance without disparity by ethnicity or economic advantage, and bettering policies that affect the teachers and classroom environment. There are 227 school districts in 85 eligible rural counties of the TRSI, enrolling 200,000 students K-12, 60% of whom are minority: 50% Hispanic and 10% African American (J3-4)."[9]

Successful Partnerships

Critical to the competitiveness and funding of these two multi-institutional projects was the development of successful partnerships. Successful partnerships are contingent on successful relationships. The effectiveness of these two examples described above is a

direct result of the efforts of each partner to identify, individual and collective strengths along with common goals and objectives to develop a collaborative vision. In the case of the collaborative projects described, a series of facilitated discussions that explored each project's vision within the context of funding opportunities and expertise of the partnership resulted in a broad plan for systemic reform. This plan was refined by inviting representatives from each of the constituencies represented in the collaborative partnership to participate in focused meetings designed to identify areas of need and strategies for improvement. Further refinement through a consensus building process that involves all partners and results in a ranking of issues of concern and strategies to address these narrowed the focus of the plan and put everyone on the same track. This democratic process increased the level of "buy-in" that was needed and strengthened the collaborative partnership and create a competitive grant proposal.

SYSTEMIC CHANGE

The term systemic change is used frequently among those discussing educational reform. The presenters choose to use a working definition of systemic change as defined by the NSF.

NSF Drivers for Systemic Reform

The NSF Drivers for Systemic Reform can be found in program guidelines, such as those for the TRSI program. These include:

- Rigorous, standards based instruction for all students and the curriculum, professional development, and assessment systems to support that instruction
- Unified set of policies to facilitate and enable the first driver
- Unified application of resources to enable the first driver
- Mobilization of all stakeholders to enable the first driver
- Increased student attainment in SMT (science, mathematics and technology)
- Reduction in attainment differences between those traditionally underserved and their peers [10]

Results also suggest that a high level of commitment, a change in attitudes and focus, along with sustainability greatly contribute to having systemic change occur. Commitment is a critical part of any successful project to be developed, implemented, and sustained. Interviews with faculty involved in the Foundation Coalition project indicate changes in attitude and focus with regard to first and second year undergraduates, where prior to their involvement in Foundation Coalition activities, faculty had typically viewed senior and graduate level courses as those most desirable to teach.[11] Proposals seeking funding for partnerships should be able to address these issues and incorporate systemic and sustainability components and rationale into proposal conceptualization and development.

PROPOSAL DEVELOPMENT

Creating an effective partnership for a proposal goes beyond merely chasing the dollar and creating a group to pursue grant funding. Personal goals of the researcher(s) should be reviewed and the question asked: what would I, as a researcher, like to pursue in the way of a research partnership? What are my (our) interests involving educational issues as components to research?

Often, the most difficult question to pose is: do these personal goals match proposal guidelines? If not, then it is doubtful the project would be funded. If so, then a next step might be to follow the proposed work plan as defined by the presenters to build a research interest with an educational focus.

The presenters in their facilitated workshops suggest a proposal development plan that includes gathering for discussion those individuals who will be involved in the process if funded and those impacted or having an interest in the concept. Researchers in the hard sciences, in addition to those involved from colleges of education or even teachers may be involved on this team. If a large number of individuals are involved, the group should be divided into smaller groups of no more than six individuals to allow for discussion by all involved. A suggested agenda for the workgroup is below.

Suggested Workgroup Planning Agenda

- **Introductions - roundtable**
  - name
  - research interest
  - how does your research interest fit into an educational focus
    Possible Topics might include:
    - K-12 pre-college students
    - K-12 Teachers
    - Pipeline to graduate school (REU, other)
    - Retention
    - Mentoring
    - Residence Halls

- **Workgroup(s) extend above discussion to a fundable project concept**
  How will you support or involve other mathematics, science, education faculty and/or existing programs?

- **Develop a preliminary plan for implementing**
  Development of a project (assign roles and tasks)

- **If multiple workgroups, each reports results of their group's discussion and plan**

It should be noted that this model was created simplistically for purposes of exhibiting a process. As we all know, uniqueness of a question or problem will dictate whether the model should be adapted for the needs, barriers, or complications arising from group dynamics, complexities of a project, or other situations unique to the institution(s) or members of the workgroup. Also, it is recommended that times be assigned in which each portion of the agenda (major bullets in bold above) is to be completed.

ACKNOWLEDGEMENTS

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