Project Abstract

Northeastern University’s (NU) Center for STEM Education in collaboration with the Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems, ALERT, and the Center for High Rate Nanomanufacturing has built a RET program (RET-PLUS) that has supported the development of close to 100 STEM change agents throughout partner schools. NU RET site participants are recruited from K-12 school districts and partner community colleges. Participants and mentor faculty engage in collaborative inquiry through shared research experiences that deepen the content knowledge of participants, build understanding and professional respect, and provide opportunities for leadership and professional development for all members of the RET team.

Educational Goals and Learning Outcomes

- Implement a comprehensive RET program for participants that includes engineering research and supporting professional development.
- Develop curriculum material as an effective professional development strategy and integrate research experiences into classroom instruction.
- Create a comprehensive model for K-16 STEM classroom support that can be replicated by other Universities and Engineering Research Centers nationwide.
- Build and support a K-16 STEM community: a dynamic partnership between RET participants, undergraduate and graduate STEM students, higher education faculty and private industry.

Approach/Methods

Participant Recruitment, Application, and Selection

Recruitment - Applications are distributed electronically to teachers, principals, and STEM leaders throughout MA beginning in early January. A program announcement is also faxed to partnering schools/school districts (those who have signed a letter of commitment to the program). It is also sent to former participants who may wish to apply again or share with colleagues.

Application - Each applicant completes a two-page application, submits a current résumé, a letter of reference, and a letter from their principal committing them to 3 days of leave during the year for professional development/attend NSTA Conference. Selection - Participants are selected based upon their application responses and their interests compared to available labs.

Lab Recruitment and Selection

Labs are recruited in early January. Mentor requests are sent to partnering Research Centers, as well as new STEM faculty identified by Department Heads or current faculty mentors. Interested labs complete research assignment forms (an abstract of the project) and final lab selection is based upon the interest of the current year’s assignment. Assignments and labs selected may change from year to year.

Program Model

Participants spend six weeks on campus, a bulk of that time in their respective labs. The lab activities are supplemented with lesson development discussions/practice, professional development, and optional field trips and research seminars coordinated in conjunction with the Gordon CenSSIS REU program and the Center for STEM Education’s Young Scholars Program (high school students). Tables 2 and 3 represent the results of a recent survey of participants from the 2008 RET program. Participants are required to create a lesson plan and research poster for the final presentation.

Outcomes and Broader Impact

One of the final products of this program which tends to have a broad impact is the lesson created from these experiences. NU RET alumni have also assisted with Professional Development at new RET sites and often return to deliver professional development to new cohorts in the RET-PLUS program. NU’s RET program also seeks to raise awareness for the RET program nationwide, to build collaboration across funded programs, and to share lessons developed for classroom implementation.

Back in the Classroom

Lessons serve as a way for the teachers to revitalize their curriculum and bridge the gap between real-world science and science in the classroom. Lessons at the end of the program are just a beginning for the teachers and often lead into complete units.

Successful lessons and units have enhanced STEM classrooms across the state and many teachers have been asked to replicate these lessons for summer programs. They also serve as an ever-expanding resource for teachers across the city, districts, states and beyond. In the end, the hope is that the teachers who participate feel that they have improved their teaching based upon these experiences and that their classrooms have been enhanced.

Table 1 - 2008 labs, disciplines, affiliations, and participants

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<tr>
<th>Lab</th>
<th>Discipline</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Laboratory</td>
<td>Engineering</td>
<td>University</td>
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<td>Laboratory</td>
<td>Biology</td>
<td>Community</td>
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<td>Laboratory</td>
<td>Chemistry</td>
<td>High School</td>
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<td>Laboratory</td>
<td>Computer</td>
<td>Industry</td>
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Please indicate the degree to which you agree or disagree with the following statements:

1. The RET program this summer allowed me to experience the full range of the engineering design process. Typically one cannot achieve the experience of the full cycle in a professional development experience... (RET program name) went through all the aspects of the cycle including real-life constraints. The ability to go through the whole cycle will always have an impact in my classroom discussions on engineering.

2. I will come away with a developed lesson plan and a personal working knowledge of the process I will be working on. It will also serve me as the foundation of a new classroom discussion on engineering.

3. It is good to have the opportunity to challenge myself with new advanced lab work. I think this experience will help me to continue my education, my new my teaching, and to teach with more modern research.

-Responses from 2009 participants on what impact participation in the RET program had on how and what they taught.