Provost's Learning Innovations Grant for Faculty  
Special Request for Proposal  
Course Development  
2009-2010

Please hand-deliver your completed grant proposal (cover page, 4 pages, plus attachments),  
the original plus 15 copies, to:  
Susan DeWoody, 1530 Wallace (Bldg 5)  
by 4:30 p.m.  
Friday, May 1, 2009.  
No hand written proposals will be accepted.  
Notification of awards will be made by Friday, May 29, 2009.

Project Title: Creative Workshop: PreK-12 Science & Math

Applicant(s):

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<th>Name</th>
<th>Telephone</th>
<th>Dept.</th>
<th>College</th>
<th>Science</th>
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<tbody>
<tr>
<td>Elizabeth Perry</td>
<td>585-475-4604</td>
<td>Biological Sciences</td>
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1. Title and summary of proposed project.

**Creative Workshop: PreK-12 Science & Math**

The proposed project will provide RIT undergraduate students the opportunity to develop creative and innovative teaching materials, exhibits, tutorials and other outreach resources designed to engage young children in the STEM disciplines. Targeted towards learners as young as three years old, this enhanced early enrichment will potentiate future academic, research, social and entrepreneurial success, and will help to address the growing crisis of inadequate science, mathematics, technology and engineering literacy in the United States. For our RIT undergraduates, the experience will help them to solidify and integrate their own foundational learning, engage in meaningful ways with the Greater Rochester community, learn the basics of interdisciplinary collaboration and product/project development, and explore career options and interests related to science education at all levels/stages.

2. Targeted learners or population (include cluster, departments, year level, number of learners impacted).

**RIT Students:**
The pilot project will initially be designed around the faculty member’s winter and summer quarter Cell Biology classes, and will be open to 9 Cell Biology students who will serve as Biology content specialists. Students with specialized skills in studio art, computer animation and other focus areas will be recruited to participate—as well as students from other College of Science degree programs such as Mathematics, Physics and Imaging Science.

Ideal class composition (per quarter):
- 5-9 Biomedical/Biology students (2nd - 4th year level)
- 5-9 Arts, Computer, Animation students (2nd - 4th year level)
- 5-9 Engineering, Math, Physics, Imaging Science students (2nd - 4th year level)

The course would be run by Elizabeth Perry 1-2 times per year; once established, the pedagogical model could be very easily adapted by other faculty members across the campus, and at other institutions. This project would also work extremely well as an interdisciplinary Honors Program offering.

**School Age Children:**
Our primary focus will be on children 3-10 years of age. We will be developing “pre-Science” materials that teach the fundamental concepts of science and math through enhanced exploration and play. It is now widely accepted that birth to 10 years of age is an essential period for acquisition of language skills (reading, speaking, writing, etc.). In the emphasis on pre- and early-language skill development, even nationally ranked school districts do not place a strong enough priority on Math & Science in the PreK-4 curriculum. The critical neurological developmental window which optimizes language acquisition, also presents the best opportunity for learning foundational concepts shared across the STEM disciplines (e.g. change over time; the concept of scale; energy/force; cause & effect; interconnection of systems). Too often, pre-science and pre-mathematics skill building is neglected until the 4th or 5th grades. In schools/districts with more limited resources, science and mathematics lag dramatically.

3. The number of students who will be affected.

**RIT Undergraduates:**
Approximately 15-54 students per year.

**Children ages 3-18:**
It is difficult to quantify potential impact on young children. Theoretically, the reach would be limited only by distribution and ease of access. A conservative minimum estimate of young children benefited might be set at approximately 100-250 individuals per year. With increasing engagement of elementary school teachers, that number could dramatically increase. This project will also expand on previous
and current outreach exhibits planned for the annual ImagineRIT festival—thereby, reaching a large number of school age children throughout our community.

Part of the project development would be to further develop existing relationships: The Corner Place Community Center: School #35 RCSD; YMCA School Age Children program (SAC); Nazareth College, School of Education; San Lorenzo Montessori Academy— and to actively forge new partnerships. A short list of additional groups to engage might include Margaret’s House (at RIT), WXXI/local PBS, Rochester Museum and Science Center (RMSC), and the Strong National Museum of Play. RIT students with cyber-expertise would offer this project a substantial web presence—greatly enhancing impact numbers.

4. Present a rationale for your project, as it relates to the area you have chosen.

The proposed course would create an interdisciplinary, community-based, creative, highly intellectual and analytical learning opportunity for RIT undergraduate students, and has strong potential to make a significant impact in an area of urgent national need. By working with community partners, RIT students will learn how to beta-test projects, ideas and materials, and how to make the necessary adjustments and revisions. They will learn how to look at scientific and mathematical concepts from many different perspectives, and how to take advanced college-level material and modify it to exciting and essential concepts that are easily mastered by young children, their teachers, and their parents.

Teaching is a powerful way to learn; even for experienced professors and advanced researchers, meticulous preparation of material for presentation can reveal connections and nuances previously unrecognized, or taken for granted. In taking the role of “teacher” (either directly or through creation of materials), our RIT students will have a motivation to step outside of time-worn roles and to take more active responsibility for themselves and their own learning. This kind of activity can also build academic confidence and emotional maturity that greatly enhance classroom success.

On a larger scale, it is a logical extension of RIT expertise for us to play a more active role in shaping national science and mathematics “fitness.” This kind of activity is also excellent for highly positive media and public relations. In addition, by increasing the STEM proficiency and likelihood for success in our youngest neighbors, we are also growing the potential pool of highly desirable future applicants for our undergraduate and graduate programs.

The faculty member has a diverse academic background which includes both Liberal Arts & Science. Work experience in educational settings spans preschool to graduate, and includes teaching, research, course/curriculum development, project management, and administration.

5. Anticipated impact on teaching and/or learning.

Through scrutinizing and manipulating the process of learning from a variety of perspectives, RIT students will develop a more sophisticated understanding of their own learning styles, and take a more active role in the process. For faculty, focusing on success in PreK-12 science can open up new ideas for improving college-level curricula. Play, fun, excitement—these are essential elements of science outreach with young children. It is anticipated that there will be considerable carry over into new ways of thinking about higher education. (In the College of Science at RIT, activity-based curriculum reform has already been very successful in Calculus, Physics and Introductory Biology; it is anticipated that this project will have strong synergy with those efforts).
6. How will your project impact student success (i.e., retention, innovation, in society)?
To summarize: this project will help RIT students to develop a more active approach to, and philosophy of, STEM education. It will help to better prepare young children for success in future science and mathematics courses. It will engender confidence and enthusiasm in all the individuals involved, and it may also help RIT students to discover interests in teaching and science leadership. There are few things as empowering as discovering you have something valuable to contribute.

7. How will you measure the course impact, and what could you share about your project in a faculty forum?
Creating an effective metric for determining the success of this project will need to be a part of the development phase. This will be particularly important when applying for outside funding for expansion and future support. It is anticipated that the impact and success of this work will be determined by a well designed survey of participants, and also by monitoring the degree of community response (as in use of materials) by teachers, parents, children and other stakeholders.
Any opportunity to share results, problems, ideas and other input with/from colleagues will be welcomed. Once the model has been developed and tested, it will be available as a template for anyone who wishes to do something similar.

8. Provide a timetable of the development of the course.
Summer Quarter (2008-4): Faculty effort in course design and additional development of collaborative partnerships; extensive literature review of existing programs, models and theory related to the program goals.
Winter Quarter (2009-2): Pilot the concept as a small independent study (in Honors and/or Biomedical Sciences) with one interdisciplinary project team of approximately 9-10 students.
Spring Quarter (2009-3): Review of pilot outcomes and revision of course design, as necessary.
Solidify summer venues/opportunities for collaboration: YMCA, day camps, community centers, summer schools, etc.
Summer Quarter (2009-4): Full launch of the new course. Up to 30 students.
Winter Quarter (2010-2): Repeat full course.

Please Note:

No hand written proposals will be accepted.

Absolutely no proposals will be accepted after 4:30 p.m. on Friday, May 1, 2009. Hand-deliver the grant proposal (4 pages maximum, plus attachments) plus 15 double-sided, 3-hole punched copies to Susan DeWoody, 1530 Wallace (Bldg. 5). Also, email your full proposal to her at skdetc@rit.edu. NOTE: PLEASE DO NOT USE YOUR OWN FORMAT, BUT CONFORM TO THE ABOVE FORMAT. Thank you!