TUES (Transforming Undergraduate Education in STEM)

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Based upon presentations at GRC Workshop in Washington, DC, Feb 2010
TUES

• **Review criteria:** (1) propose materials, processes, or models that have the potential to enhance student learning and (2) involve a significant effort to facilitate adoption at other sites
Purpose of TUES Program

• To improve the quality of STEM education for all students by targeting activities affecting learning environments, course content, curricula, and educational practices.

• To support projects at all levels of undergraduate education.

• To support activities in the classroom, laboratory, and field settings
TUES

• Explicit encouragement of projects that have the potential to be TRANSFORMATIVE

• Increased emphasis on (i) building on knowledge of how students learn, (ii) building on prior work, (iii) and encouraging widespread adoption of excellent teaching methods
TUES Project Components

• Creating Learning Materials and Strategies (guided by research on teaching and learning; to incorporate and be inspired by advances within the discipline)

• Implementing Instructional Strategies (contribute to understanding on how existing strategies can be widely adopted, are transferred to diverse settings, and impact student learning in diverse settings)
TUES Project Components

• Developing Faculty Expertise (enable faculty to acquire new knowledge and skills in order to revise their curricula and teaching practices and involve a diverse group of faculty)

• Assessing and Evaluating Student Achievement (develop and disseminate valid and reliable tests of STEM knowledge; collect, synthesize, and interpret information about student understanding, reasoning, practical skills, interests, attitudes or other valued outcomes)
TUES Project Components

• Conducting Research on Undergraduate STEM Education: explore how (1) effective teaching strategies and curricula enhance learning and attitudes; (2) widespread practices have diffused through the community; and (3) faculty and programs implement changes in their curriculum.
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- **Type 1 Projects (small grants)**

  Up to $200,000 ($250,000 when a 4-year and 2-year schools collaborate); 2 to 3 years (occurs at a single institution with primary local impact; must include assessment and community engagement)
TUES

• Type 2 Projects (medium grants)
  Up to $600,000; 2 to 4 years; builds on smaller-scale proven ideas; diverse users at several institutions
  Focus on larger-scale development, broad testing, and assessment
TUES

• Type 3 Projects (large grants)
  Up to $5,000,000; negotiable; 3 to 5 years; combine proven results and mature products; involve several diverse institutions
TUES—Important Features of Successful Projects

• Quality, Relevance, and IMPACT
• Student Focus, i.e., student centered
• Use of and Contribution to the STEM Education Knowledge Base
• STEM Education Community-Building
• Expected Measurable Outcomes
• Project Evaluation
Quality, Relevance, and IMPACT

• Innovative
• State-of-the-art products, processes, and ideas
• Latest technology in laboratory and classrooms
• Have broad implication for STEM education (even projects that involve a local implementation)
• Advance knowledge and understanding (within the discipline; within STEM education in general)
TUES—Student Focus

• Focus on student learning (project activities must be linked to STEM learning)
• Consistent with the nature of today’s students
• Reflect the students’ perspective
• Student input in design of the project
TUES—STEM Education Knowledge Base

• Reflect high quality science, technology, engineering, and mathematics
• Rationale and methods derived from the existing STEM education knowledge base
• Effective approach for adding the results to knowledge base
• Include interactions with investigators working on similar or related approaches in PI’s discipline and others

• Include interactions with experts in evaluation, educational psychology, or other similar field.

• Benefit from the knowledge and experience of others

• Engage experts in the development and evaluation of the educational innovation
IDEAS

1. Integrate a difficult concept in the curriculum through a lab …
2. Synchronize lab and course
3. Teach calculus 1 and 2 from physics, computer science, and engineering perspectives; separate sections could be created
IDEAS

4. Integrate introductory courses into Public Affairs Mission (community engagement, cultural competence, and ethical leadership)
5. Integrate Homework into cyber-learning
6. Integrate Homework into C?????
7. Use STEM education majors to help with labs and undergraduate teaching
8. Develop help labs through student-centered technology
9. Develop at-home and at-school labs
10. Develop more lab stations so that students could check out equipment and do labs at home
11. Nanomaterials education and learning
Funding Opportunities for PUI

• RUI mechanism in NSF Research Divisions
• ROA (Research Opportunity Award: to pursue research as visiting scientists with NSF supported investigators)
• REU (similar to ROA except for students)
• RET (for high school teachers)
• STEP ($S_{TEM}$ Talent Expansion Program)
Funding Opportunities for PUI

- “Educate to Innovate” Program
- ADVANCE (Increasing the Participation & Advancement of Women in Science and Engineering careers)
- LSAMP (Louis Stokes Alliance for Minority participation Program)
- AGEP (Alliance for Graduate Education and the Professoriate Program)
Funding Opportunities

• Math and Science Partnership (MSP)
• Research on Gender in Science and Engineering (GSE)
• Informal Science Education (ISE)
• Research and Evaluation on Education in Science and Engineering (REESE)
Thank You

THANK YOU!