

TUES (Transforming Undergraduate Education in STEM)

Pawan K Kahol

Associate Dean, CNAS

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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.

TUES

- 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

TUES—Community Building

- 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 in to 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

IDEAS

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!