

PROJECT PIE - PARTNERSHIP FOR INNOVATION IN EDUCATION
A SCHOOL-UNIVERSITY PARTNERSHIP FOR A GLOBALLY COMPETITIVE
SCIENCE AND MATHEMATICS EDUCATION

"Bottom Up Preparation Meeting Top Down Needs"

Mission: To ensure that high school graduates from each school of the Partnership are fully prepared to enter college with the skills and the educational preparation which are on par with those of students from the competing nations.

THE PROBLEM

- Students do not retain science and math concepts easily. They respond to traditional classroom instruction with memorization, and "plug & chug" techniques in the face of increasing pressure to perform on state tests and compete for university entrance, and are graduating with unacceptably low levels of science and mathematics skills.
- The U.S. now ranks 17th in the proportion of its 18- to 24-year-olds earning science & engineering degrees. In 1975, the U.S. ranked third.
- Lack of sequential buildup of subjects through the school years leads to poor retention of subject material and lack of appreciation of arenas of influence of various disciplines and poor performance on standardized tests.
- There is a decreasing number of science and mathematics teachers in schools.
- Teachers teaching out of their disciplines do not have a strong grasp of science and mathematics to be more confident in the classroom.
- Teachers are given inadequate preparation which leads to lack of competency in content and pedagogy.
- Teachers are not given adequate support required to develop high energy, interactive, effective experiences for their students every day.
- Teachers are held accountable according to a standardized test.
- The current salary structures are not conducive for recruiting and retaining science and mathematics teachers.

THE NEED - MULTIFOLD

- Projections show a need for over 2 million new teachers in this decade, of which 240,000 will be middle and high school mathematics and science specialists.
- Of the 20 fastest-growing occupations projected through 2010, 15 of them require substantial mathematics or science preparation.
- At current rates, ten years' worth of dropouts will cost Texas \$114 billion in long-term economic output, while 20 years will cost our economy \$228 billion.
- The U.S. has an uncertain future because of a "troubling decline in the number of U.S. citizens who are training to become scientists and engineers."

INTERNATIONAL COMPARISONS

- The Bologna declaration, made by the higher-education ministers from 40 European nations, commits their governments to reforming their university systems to create a European Higher Education Area by 2010.
- Middle and high school education in China, India, Korea are based on strong mathematics content.



OUR APPROACH

- Provide training for in-service teachers in science and mathematics in interactive learning environments based on hands-on projects - projects relevant to real world integrating science, mathematics, technology and business (Science Education Center in the Physics Department-<http://www.i2i.pvamu.edu/physics>).
- School and university faculty collaborate on *every* element of student preparation - curriculum alignments, lesson plan preparations, feedback and assessment mechanisms, test preparations, learning assessment, career counseling, among others.
- Design a spiral curriculum that provides a sequential build-up of course material with vertical and horizontal integrations.
- Emphasize the "real world needs" (college or workforce) at each stage in school and correlate them with the curriculum content.
- Establish an interaction between pre-service teachers, in-service teachers and the university faculty.
- Involve parents, school administrators and community leaders in student development.
- Establish year-round mentoring, periodic interaction with industry personnel, and communities of learning and communities of practice.

EXPECTED RESULTS

- Teachers with enhanced competence and confidence to design and implement the curriculum, and assess student performance and learning.
- A well-designed, spiral curriculum in science and mathematics that is on par with that in competing nations.
- A more comprehensive understanding of science and mathematics, and their relation to a diversity of careers.
- Seamless transition from high school senior to freshman at any college/university.
- High school graduates ready to compete in the global arena.
- Uniformity of curriculum across Texas schools should reduce (even eliminate) any necessity for remediation.

UNIQUENESS OF OUR APPROACH

- Well-defined and tangible objective.
- Addresses student preparation from a systemic point of view.
- Curriculum design based on global study of science and mathematics curricula.
- Prior experience with schools and the Regents' Initiative provides an excellent "launch pad" for the initiative and points to high potential for success.
- Project based learning is a proven motivator for learning and retaining concepts.



PIE PARTNERS

A. Anil Kumar, Prairie View A&M University, Thomas Linton, TAMU-Galveston, Vivian Garza, Tyler ISD, Denise McAfee, Houston ISD, Karen Nickel, Galveston ISD, Brenda Paloski, Pasadena ISD, Cindy Wilems, Pasadena ISD. For information: (936) 857-2591, aakumar@pvamu.edu • <http://www.i2i.pvamu.edu/physics>