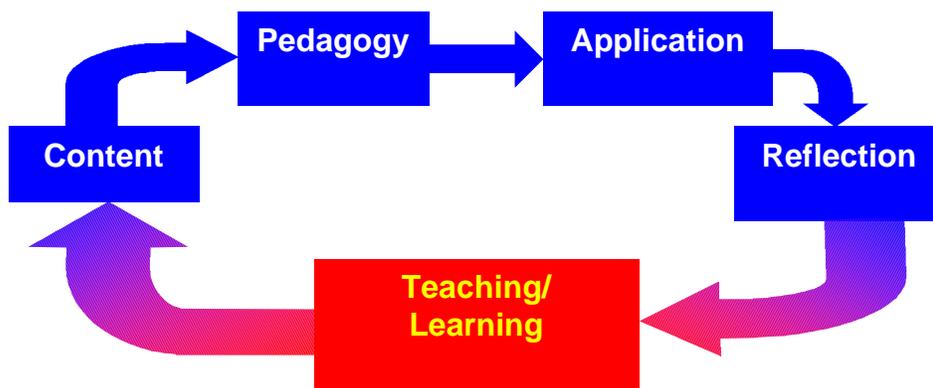


Collaborative Integrated Applications for Mathematics and Science Content and Pedagogy Among University Faculty and Public Schools

El Paso, Texas is a border community with a population of over two million people. The city is the fifth poorest city in the United States with a minority (Hispanic) population of about 78%. A collaborative effort among the Colleges of Science and Education and Public Schools was sponsored by the National Science Foundation (NSF) to improve mathematics and science education. This paper concludes the study of a six-year project. The goals of the project were:

1. To develop a working collaboration among Colleges of Science and Education and Public Schools
2. To improve pedagogical applications with content faculty and to increase content knowledge with pedagogical faculty
3. To bridge the gap between university theoretical learning and real world practice in classrooms
4. To develop a model of teaching that produces teachers capable of teaching mathematics and science to “high risk” students

No one would argue the need for teachers to know their content but content alone does not produce the results needed for all students to learn. This paper outlines a four step model of teacher training based on theories of Vygotsky and Piaget and the research resulting from the Partners for Excellence in Teacher Education (PETE), an NSF initiative project. The basic model is as follows.



Faculty from the Colleges of Science and Education team-teach integrated courses on-site in public schools. The courses are 1. Block I, The Property of Real Numbers, Curriculum, and Mathematics Pedagogy; 2. Block II, Physical Science and Science Pedagogy. The university classes are taught in schools and the Block Classes include a teaching segment in which the university students go directly from class to a classroom to practice teaching the university content using the pedagogy. University faculty and public school

teachers provide immediate and written feedback concerning the teaching segment.

PETE was funded in 1996 to investigate ways to improve mathematics and science teaching in the United States. The first step was to develop trust and respect between faculty in the Colleges of Science and Education. Many hours were spent discussing theoretical and conceptual beliefs concerning learning. Major differences in the culture of these colleges were discovered concerning learning and teaching. Faculty worked to identify common ground, agree on theoretical approaches to learning, and determine plans to combine courses and implement an experimental approach to teacher training. The science pedagogy course moved to the school site in 1997. Three semesters later the Physics department joined the pedagogy course with the integrated Block course. Based on the success of this project the mathematical block united and moved to a school the next semester.

Multiple evaluation has been used during the course of the experiment. Content pre- and post- tests, attitudinal surveys, video analysis of teaching tapes from actual classrooms, and cognitive interviews have been compiled and analyzed. ExCET test (the Texas qualifying exam for teachers) scores have been compared.

Implications could include a new model for training teachers, identifying the process for successful collaborations, and a research design for teacher assessment. Further studies of this model will be expanded to other classes at UTEP and need to be replicated at other sites.