

**The El Paso Mathematics and Science Partnership
Annual Report
October 2004 – May 2005**

I. INTRODUCTION

Year Three of the El Paso Mathematics and Science Partnership proved to be a pivotal year that moved the program's action agenda to a new level. The work in two key arenas—engagement of postsecondary faculty and building an enhanced research and evaluation agenda—received much attention and was greatly strengthened. Activities at the K-12 level, especially through the work of the MSP district directors and staff developers, were intensified and deepened. In addition, the K-16 math and science alignment work was accelerated and is significantly influencing what is taught in schools across the region.

RETURN FOR INVESTMENT

The following highlights summarize the most significant achievements of El Paso MSP over the past year. During MSP Year Three, the partnership's efforts led to the:

- Development of and preliminary approval for new language in the College of Science and University-wide Tenure and Promotion Policies, explicitly supportive of faculty work toward improved K-12 math and science teaching and learning;
- Adoption of new curriculum and instruction scope and sequence guidelines across area districts based upon the MSP math and science curriculum frameworks;
- Selection of NSF-sponsored, standards-based curriculum materials in mathematics and science in a large number of MSP schools, with a concomitant prohibition against lower-level curricula;
- Largest number ever of math and science graduates, at the baccalaureate and masters level, receiving degrees from the UTEP College of Science;
- Development and implementation of eight research and evaluation studies aimed at providing clear evidence of the impact of MSP activities on teacher, student, faculty and administrator behaviors and outcomes;
- Engagement of more College of Science Department Chairs and Faculty in the work of MSP than at any previous time;
- Significantly improved mathematics and science student achievement as measured by TAKS across all grade levels;
- Very significant increases in enrollments in college-preparatory math and science courses at the secondary level.

Among the processes and activities that were instrumental in achieving these outcomes are the following:

- Broader and deeper engagement of district Superintendents, Associate Superintendents and Curriculum and Instruction leaders in the work of MSP;
- Much clearer focus for and monitoring of the work of the MSP Staff Developers;
- Deepened commitment to MSP on the part of College of Science leaders and Department Chairs;
- New focus by MSP PI, Co-PIs, and PD on the research and evaluation enterprise.

II. OVERVIEW OF YEAR THREE IMPLEMENTATION: Activities and Findings

During Year Three of El Paso MSP, all of the key elements of our strategic plan were implemented, some to a greater degree than others. This section of the report delineates the progress made on the activities outlined in the Year Three Implementation Plan; explains changes that occurred and the reasons for those changes; discusses some of the challenges we faced; and, shares some of the lessons learned.

II.1 Key Element One: Increasing and Sustaining the Quantity and Quality of PreK-12 Mathematics and Science Teachers

Objective 1.1: Develop and enhance Master of Arts in teaching mathematics and science programs.

Objective 1.2: Create the MSP Scholars to support twenty in-service teachers each year to complete an MAT/M or MAT/S.

MAT Program in Mathematics:

In Year Three of El Paso MSP, the UTEP College of Science (COS) had the largest number ever of graduate students receiving degrees. Out of 52, thirteen were MAT-mathematics graduates. This group of students contributed significantly to that record number. Another 15 MAT-mathematics students will receive degrees this summer. Another Cohort I member, who withdrew from classes for personal reasons, has now joined Cohort II. Cohort II will enter its second year of courses beginning in Summer I with STAT 3330 Probability and Summer II with MATH 5360 Geometry and Calculus. Cohort II has retained only 7 of the original 20 students. From this group we have learned what a critical role an emphasis on teamwork can have on cohort success. It is our sense that the individuals in this group had a natural predilection to work too independently, to their own detriment. As a result, we will structure the group work much more formally for Cohort III, to reduce retention problems.

To recruit for Cohort III, packets advertising the MAT Mathematics programs were sent to all high school teachers in all El Paso area school districts in spring 2005. A total of 6 program candidates spent this past year preparing for the program by taking pre-MAT calculus courses during the fall and spring semesters. Cohort III will begin its two-year course of study with MATH 5370 Logic and Proof during Summer I and MATH 5360 Introduction to Mathematics Education in Summer II. All Summer MAT Math courses are offered at El Paso Community College's Valle Verde campus. The pre-MAT calculus classes were offered at EPCC as well. Efforts are underway to recruit potential MAT students into a fourth cohort. As with Cohort III, these recruits are being advised to take the calculus sequence during the 2005-2006 academic year, in order to better prepare them for joining Cohort IV.

MAT Program in Science:

The first MAT Science (Physical Science) Cohort, which is comprised of 15 members, will complete their coursework and graduate upon finishing PHYS 5396 Thermodynamics and CHEM 5339 Contemporary Topics in Biochemistry this summer. This first cohort of the MAT (Physical) Science program was perceived as being so successful that faculty members in the departments of Physics and Chemistry are now in the process of recruiting students for another MAT Physical Science cohort, which would begin in Fall 2005. This new cohort represents the College of Science's clear commitment to sustaining the masters program beyond MSP's support. In spring of 2005, packets advertising the program were sent to every high school teacher in all El Paso county school districts. Even though this group would not receive tuition support from MSP, the recruitment effort continues, and some students may be able to receive tuition support from their school district.

Recruitment for the Life/Earth Science cohort for the Master of Arts in Teaching Science began in October 2004 at an EPISD MINI CAST, held at Chapin High School. In spring of 2005, packets advertising the MAT Life/Earth Science program were sent to every high school teacher in all El Paso county school districts. Applicants are currently being accepted into the Life/Earth Science program in an effort to fill a cohort of at least 20. Classes for the Life/Earth Science cohort, BIOL 5327 Advances in Ecology Theory and GEOL 5401 Fundamentals of Earth Science, will begin in Fall 2005.

Objective 1.3: Create the NSF Scholars Program for Alternative Certification Professionals (ACP).

Objective 1.5: Create an induction program to keep new math and science teachers in the profession.

The goals of objectives 1.3 and 1.5 are to improve the knowledge and teaching skills of novice teachers and to keep them in the field of teaching. This is accomplished through a series of Saturday seminars throughout the year (two semesters), with a focus on building a professional community of new teachers and providing them professional development and workshops on applied classroom research

aimed at making novice teachers “reflective practitioners” of their craft who are thus more likely to stay in teaching.

NSF Scholars Program for Alternative Certification Professionals (ACP)

In Year Three, two cohorts of middle and high school math/science teachers participated in the NSF Scholars Program for Alternative Certification Professionals (ACP): ACP Cohort 1 completed their second and final year of the 2-year program, while ACP Cohort 2 completed their first year of the program.

At the start of Year Three, ACP Cohort 1 ($n = 8$) included 2 math and 6 science teachers; 6 high school and 2 middle school teachers; 4 women and 4 men; 5 Latinos, 1 African-American, and 2 of other ethnicities. All of ACP Cohort 1 had either completed or were enrolled in a master's degree program (7 M.Ed., 1 M.S.). During Year Three, two participants withdrew from the program, one due to a lack of participation (but still teaches high school science) and the other accepted a staff position in teacher professional development. Prior to the start of Year Three, one teacher discontinued participation in the program for personal reasons, but still teaches middle school science. All teachers in ACP Cohort 1 who completed the program will continue teaching in the fall.

ACP Cohort 2 ($n = 10$) included 6 math and 4 science teachers; 6 high school and 3 middle school teachers, and 1 who teaches both; 4 women and 6 men; 6 Latinos, 2 Anglos, and 2 Asian-Americans. Among ACP Cohort 2 participants, 6 have completed or are enrolled in a master's degree program (2 M.Ed., 1 M.A.T., 3 M.A.). All 10 will continue teaching and enroll in their second year of the program.

MSP Induction Program

In Year Three, two cohorts participated in the MSP Induction Program for new middle and high school math/science teachers: Induction Cohort 1 completed their second and final year of the 2-year program, while Induction Cohort 2 completed their first year of the program.

At the start of Year Three, Induction Cohort 1 ($n = 11$) included 9 math and 2 science teachers; 10 middle school teachers and 1 who teaches both middle and high school; 8 women and 3 men; 8 Latinos, 1 African-American, 1 Asian-American, and 1 of another ethnicity. All participants had either completed or were enrolled in a master's degree program (8 M.Ed., 2 M.A.T., 1 M.A.). During Year Three, two participants withdrew from the program, one due to a conflict with another teacher development program and the other due to a lack of participation, but both still teach at the middle school level. Prior to the start of Year Three, two teachers discontinued participation in the program, one due to conflicts with other commitments (but still teaches high school math) and the other to teach at the university. All teachers in Induction Cohort 1 who completed the program will continue teaching in the fall.

Induction Cohort 2 ($n = 14$) included 8 math and 5 science teachers, and 1 who teaches both; 5 high school and 9 middle school teachers; 8 women and 6 men; 8 Latinos, 1 Anglo, 4 Asian-Americans, and 1 of another ethnicity. Among Induction Cohort 2 participants, 8 have completed or are enrolled in a master's degree program (3 M.Ed., 2 M.A.T., 3 M.A.). All 14 will continue teaching and enroll in their second year of the program.

Objective 1.4: Recruit undergraduate engineering students into secondary math/science teaching.

As outlined in El Paso MSP's proposal, this action step was aimed at identifying 15 to 20 engineering students each year who, for a variety of reasons, decided that they wanted to complete the engineering degree but were more interested in a career in teaching than in an engineering field. These students were then provided stipends to deepen their understanding about teaching generally, and secondary math/science teaching in particular. Despite the College of Engineering's success in recruiting students into the program, and providing them opportunities to work with university faculty and high school teachers, few students actually took teacher preparation courses, and fewer still went into teaching. Because of the growing realization that this activity was not leading to an increase in teacher quantity and quality, it was jointly decided by MSP and College of Engineering leadership, and with the approval of

NSF program officer Dr. Joan Prival, that the program should be discontinued as of the end of MSP Year Three.

Objective 1.6: Build a solid mathematics and science focus in high school magnet programs.

The coordinator has been in contact with nine area magnet programs, six of which are pre-collegiate teacher preparation programs, (at Riverside High School, Americas High School, El Dorado High School, Montwood High School, Socorro High School, Burges High School), two of which are health sciences programs (at Bel Air High School and Silva High School), and one of which is a science and engineering program (at Chapin High School) The coordinator has finalized the data collection process, including gathering information on size/makeup of the programs, field experiences of students, and curriculum, for seven of the programs (Riverside, Americas, El Dorado, Montwood, Socorro, Burges and Bel Air), and initiated the process at the remaining two (Silva and Chapin). She has corresponded with the faculty at all four Academies of Careers in Education (ACE) in the Socorro Independent School District (Americas, El Dorado, Montwood, Socorro) to establish a data base regarding their content knowledge, expertise, areas of certification, and professional development needs. The upperclassmen in the Socorro ISD ACE programs were also administered surveys to document their teaching interests by grade level and specific subject.

The directors of the two most established pre-collegiate teacher preparation programs (Riverside and Socorro) participated with the coordinator in detailed meetings on the curriculum of their programs, with a focus on the conceptualization and implementation of students' field internships, in addition to expressing their views on the kind of data that would be most useful to their programs in a tracking instrument. The coordinator also participated in various professional development workshops throughout Year Three with faculty from Riverside, Americas, El Dorado, Montwood, Socorro, Burges, and emerging programs at Canutillo High School and Clint High School.

Objective 1.7: Build a cadre of mathematics and science staff developers

Twenty-six MSP school-based staff developers continued to work closely with high schools during year three of MSP. They received bi-weekly professional development focused on three topics: enhancement of content knowledge through content-based training and lesson design; effective coaching strategies to improve the quality of teaching and learning; and, utilization of student achievement data to influence classroom instructional decisions. Staff developers received over 140 hours of professional development.

In order to facilitate their role as effective coaches and to help them organize for effort, the MSP staff developers were provided five tools: 1) Action Agendas that outlined their responsibilities in classrooms within a given period of time, and which defined what they would be held accountable for; 2) the Professional Teaching Model (PTM), an organizational structure for planning, delivering, and assessing lessons with teams of teachers in math/science departments a minimum of three periods a day; 3) the Math and Science Teaching and Learning Protocol that provides a rubric for what high quality math/science teaching and learning look like in classrooms; 4) the Math and Science Curriculum Frameworks to guide and inform content and pedagogical content; and, 5) an on-line daily Staff Developer Log that must be submitted weekly by staff developers to their respective MSP District Directors to assist in monitoring their work in schools and classrooms.

A key strategy for sustaining the work of the staff developers in high schools, as they prepare to move to the middle schools in Year Four, was to build strong relationships with over forty (40) department chairs and to provide them training to be able to continue the work. Staff developers and department chairs joined principals in over 30 hours of professional development to help frame the roles and relationships of the three campus leaders in affecting student achievement. Department chairs participated in a full cycle of the Professional Teaching Model and shadowed staff developers as they processed lessons with teachers so that the model of classroom-based professional development would grow and be sustained beyond the presence of on-site staff developers. Although sustainability will be a major

challenge, the ground work was set in Year Three and professional development for high school principals and department chairs will continue in Year Four. An emphasis on strengthening content leadership through analysis of exemplary teaching and learning will be at the core of their professional development.

Objective 1.8: Build a cadre of outstanding math and science teachers through National Board Certification.

The results for Year 3 for this objective have been mixed, in spite of an immense effort to meet all elements of the objective by the El Paso MSP National Board Coordinator, Deborah Svedman. Ms. Svedman, a high school math teacher and the first National Board certified teacher in El Paso, has put huge amounts of energy into informing teachers and administrators about the National Board and the benefits of having teachers go through the NB certification process and be identified as exemplary teachers.

Recruitment and Promotion Activities. Letters about the National Board certification process were sent to more than 2,000 teachers in the El Paso region. In addition, teachers paid visits to graduate classes, and in the spring of 2004, another for-credit class on National Board assessment was taught by Svedman. In addition, Svedman made several presentations about the National Board at meetings of teachers, principals, and school board members, in addition to a presentation to all the local district superintendents. Information packets were also sent or given to the above groups. In spite of all of this effort, only 4 teachers went through the year-long certification process. Of these, only one has achieved National Board certification, one has partially passed the process, and two others are awaiting notification of their results. An additional two are in the process of enrolling in and beginning the certification process. Another graduate course for teachers interested in the certification process will be taught this fall (2005) by Ms. Svedman.

Obstacles to Completion of National Board Certification. What we are learning from our experience in El Paso is that there are three major obstacles to the increased recruitment of teachers into the National Board certification process. The first is information about the benefits of national board certification. Nationally, many teachers have described the rigorous certification process as the best professional development experience that they have ever had (there are now more than 40,000 NB certified teachers in the U.S.). The second obstacle is the certification fees for the assessment process, now about \$2500 per candidate. The third obstacle is incentives for teachers who go through the rigorous assessment process. Many states and school districts have pay incentives for teachers who successfully complete the process. North Carolina, for example, is the state with the largest number of NBC teachers (more than 8,000). The state pays the certification fees for teachers who go through the process, offers days of release time for teachers to take the assessment, and offers a 12% pay increase for teachers who successfully complete the process. Texas, on the other hand, has few incentives for its teachers, aside from those offered by a few districts. Texas has fewer than 200 certified teachers. This last obstacle has been a major one in El Paso. Even when we provide sufficient information, provide course credit for preparing for the assessment, and offer to pay the assessment fees, many teachers report to us that it is not worth the effort to go through a year-long assessment process. There is little recognition or pay increase for teachers already under tremendous pressure from high stakes testing and statewide accountability. Part of the focus in Year 4 will be to continue pressing local school districts to consider providing incentives for their teachers to go through the certification process.

Objective 1.9: Increase and enhance the involvement of STEM faculty as active partners in El Paso MSP

A variety of action steps were taken to involve more STEM faculty actively in El Paso MSP and to better understand the range of existing activities. A significant structural change in the College of Science was to assign oversight responsibility for MSP activities to newly appointed Associate Dean, Kate Miller. Dr. Miller, a geophysicist by training, is a former chair of the Department of Geological Sciences who has an established funding record in geoscience education. Dr. Miller is working closely

with Interim Dean, Michael Eastman, to develop a broader culture of valuing partnership with K-12 teachers and schools among science faculty members. Throughout the past year, at both College of Science chairs' and faculty meetings, Dr. Eastman placed a strong emphasis on the importance of recruitment into science and mathematics undergraduate majors, and on how that need must translate into greater faculty interaction with El Paso schools and teachers. They are strongly encouraging faculty members, hired as a result of MSP, to take a leadership role in publishing the results of their MSP-related research and in engaging their discipline colleagues in related research activities.

We have found that the implementation of the MAT degrees is an effective means for enhancing the involvement of STEM faculty as active MSP partners. For example over the course of the physical science MAT program, the chemistry department has evolved strong support for and interest in its success. Three discipline faculty members who have taught in the program are now strong advocates for it and are among those pushing to recruit a second cohort. We are optimistic that similar interest on the part of faculty will come about as a result of the life/earth science cohort that is scheduled to begin in Fall 2005. While a number of faculty members are clearly engaged in teaching the MAT programs, another measure of faculty involvement in teacher training is the percent of UTEP science and math faculty who teach courses required of pre-service teachers. Most of these courses have content designed specifically for pre-service teachers, thanks in part to curriculum reform undertaken under UTEP's CETP initiative, PETE, and through MSP. During the 2004-2005 academic year, 56% of Biology, 36% of Chemistry, 67% of Geology, 85% of Physics, and 67% of Mathematics faculty taught such courses. These numbers likely underestimate the number of faculty members who regularly teach these classes, because it is usual for faculty to cycle the courses they teach, especially in departments with large graduate student populations. For example, some faculty members in these departments may teach lower division science and math courses on an every-other-year basis.

Another very good example of core faculty engagement in K-12 are the two workshops to be provided this summer by the Physics Department Chair, Dr. Jorge Lopez. The first is "Physics for Pre-K and K Teachers," a full-day, bilingual, hands-on session, held on June 13 and repeated on June 14. Focusing on four physics concepts—light, matter, electricity, and sound—the activities are designed to assist teachers to lead their young students to think and learn according to the scientific method. The second is, "Deepening Science Knowledge for High School Physics Teachers." The two-day, hands-on session, will be held on July 20th and 21st. Working with recommendations from MSP staff developers on the areas they observed would be most productive for teachers, Dr. Lopez designed physics workshops for participants to engage in activities that demonstrate wave interactions within various materials; investigate and demonstrate movement of heat through solids, liquids, and gases; and, identify and analyze electric forces.

To help improve the effectiveness of teaching and learning in postsecondary courses at UTEP and to help faculty become more aware of and understand the goals of MSP, Dr. Helmut Knaust, Chair of the Math Department, initiated a series of biweekly mathematics teaching and learning seminars, coordinated by mathematics lecturer Tuesday Johnson, which were held throughout the 2004-2005 academic year. The 12 seminars were very well-attended by math faculty with more than 10 people present at each seminar on average. In addition, a group of about 10 science faculty members met informally on a biweekly basis throughout the fall semester to discuss science teaching and learning.

This year, we also made a concerted effort to gain a deeper understanding of the breadth and variety of college faculty participation in K-12 activities. Anecdotally we know that science and math faculty members regularly interact with K-12 teachers and students in a range of ways such as presentations in schools and at UTEP, acting as judges in science fairs, and service learning activities. However, these activities are notoriously hard to document, although some do appear on the merit evaluation forms that faculty submit annually. This year, chairs in the college were asked to poll their faculty and provide documentation of departmental activities for the academic year. Each department, including the Centennial Museum and the Environmental Science program, submitted spreadsheets that summarize

their activities. We estimate that these spreadsheets document 80 to 90% of faculty activity in the K-12 area. Through these reports we have learned that over fifty faculty members in the College of Science engaged in hundreds of hours of outreach activities in El Paso area schools as well as in the community at large. Faculty engaged in activities such as meeting with in-service mentor teachers, offering content courses to prospective K-4 teachers, and helping local high school students develop research projects that won top awards at the state level.

In addition to the work of the College of Science, the College of Engineering hosted workshops for MSP math/science directors and staff developers. The first workshop, held on May 16, 2005, focused on describing the programs of the College for supporting transition from high school to university undergraduate education, the opportunities and challenges commonly shared by university faculty and K-12 teachers, and the role the College can play in supporting MSP programs led by the MSP Staff Developers. Dr. Barry Benedict, the Dean of the College of Engineering, convened the May 16 workshop. Dr. Peter Golding from the College of Engineering demonstrated several techniques for achieving active engagement in the basic engineering classroom that have application in math and science classrooms. In addition, Dr. Walter Fisher, Associate Dean, shared enrollment data, and detailed the development of the Entering Students Program and talked about the importance of a strong foundation in math and science education, and the breadth of skills needed for success in engineering. Other faculty making presentations included Dr. Gary Hawkins, from the Mechanical Engineering program, and Dr. Stephen Stafford, who presented the Boeing model for collaborative teamwork and discussed how the model is applicable to College faculty and teachers in math and science classrooms.

The June 2nd 2005 workshop featured faculty from disciplines in each of the engineering programs who shared the curriculum focus of their discipline. The faculty presented examples of the relevance and application of mathematics and science in their coursework. MSP math/science staff developers engaged the presenting faculty in discussion of their subjects and how they pertain to TEKS content and requirements. For example, Dr. Stephen Stafford showed how he features case studies in failure analysis and uses streaming media to teach courses on materials engineering; Dr. Roy Arrowood shared the Pre-Professional Certification checklist used by students in metallurgical and materials engineering; and, Dr. Stella Quinoñes presented quiz examples from courses she teaches on corrosion prevention in microelectronic devices. The coursework is part of the electrical and computer engineering class inventory. Other faculty presenters included: Mr. Manny Pacillas, Director of the Institute for Materials and Manufacturing Management at UTEP and an engineering instructor in core university classes, and Dr. Scott Starks, Director of the Pan American Center for Earth and Environmental Science and an engineering faculty member in Electrical and Computer Engineering.

An additional important element of El Paso MSP's work toward engaging STEM faculty in K-12 math/science education, is the work focused on UTEP's Tenure and Promotion policies. That work moved to a new level during MSP Year Three, as the new University Provost, and MSP Co-PI, Richard Jarvis, brought together UTEP's Vice President for Academic Affairs and Dean of the College of Science (COS) to discuss proposed changes to both College and University-wide guidelines. After the drafting of proposed new policy language, the University leadership team agreed to engage University Deans, as well as department chairs in the COS, in discussion of the issue and proposed language changes. These discussions, which will take place in fall 2005, are expected to move the policy issue to the Faculty Senate sometime in Year Four.

II.2 Key Element Two: Building School and District Capacity

Objective 2.1: Establish Principals' Academy to facilitate and sustain school improvement efforts.

In Year Three, 250 principals and assistant principals participated in over 90 hours of professional development provided through MSP Leadership Academies. Over 90% of El Paso MSP principals attended three or more seminars. Academies prioritized three key areas: the development of content leadership which provided principals the opportunity to examine mathematics and science

teaching and learning in classrooms; coaching and facilitation skills for leaders to better enable administrators to work effectively with teacher groups and facilitate thinking through effective questioning; and, utilizing data to inform decisions and develop a school culture that is more evidence-based in practice. The use of the El Paso MSP Teaching and Learning Protocol provided a rubric to examine and learn about challenging math and science content. The Protocol effectively frames a vision for teaching and learning, and offers vocabulary and context that supports principals in engaging in focused dialogue with teachers. One principal shared that the protocol gave her the confidence for productive dialogue with teachers in content areas where her personal knowledge was weak. El Paso MSP district directors continued to play a central role in strengthening the instructional leadership of principals by providing follow-up sessions based on topics initiated in the Academies.

Commitment to high quality teaching and learning and accountability drove El Paso MSP to organize two MSP Teaching and Learning professional development events; one in December, 2004, and the second in May, 2005. Over 350 PK-12 educators along with 10 University and Community College core faculty participated in the events in which 178 high school math and science teachers opened the doors of their classroom for principals and district leaders to utilize the Protocol and observe real time teaching and learning. The event made a compelling case to PK-16 educators for the need to teach at higher levels of cognitive demand. Significant improvements were evident between December and May in teachers' classrooms due to the efforts of staff developers. However, it was clear that a shift from mostly procedural teaching to deep conceptual understanding still remains a challenge. Year Four of MSP will bring additional opportunities for teachers and principals to observe exemplary instruction and analyze teacher practice.

Objective 2.2: Build District Level Capacity for School Sites

Quarterly meetings with all Superintendents continue to set the tone and expectation for accomplishing the goals of MSP. This is buttressed by monthly meetings between district Associate Superintendents and/or district directors, and Collaborative staff. These regular meetings strengthen the partnership, and provide opportunities to monitor progress and implementation of MSP goals, objectives and activities, and to make necessary adjustments. Over 200 district leaders participated in over 70 hours of professional development sponsored by MSP.

Significant progress was made in institutionalizing the work of MSP within the districts. The three urban districts prioritized MSP goals by hiring district-funded math and science facilitators or coaches. The Executive Director of Region 19 also funded two additional math/science staff developers to strengthen the work in the rural elementary schools utilizing the tools of MSP. One district doubled the number of math/science content facilitators on staff from four to eight, and redesigned its organizational structure to match its commitment to MSP. It hired eight additional content specialists, and the MSP district director will oversee all instructional and fiscal decisions regarding mathematics and science. Two districts held district-wide mathematics summits utilizing MSP data tools, Curriculum Frameworks and the Teaching and Learning Protocol. District commitment to MSP is also reflected in one districts' provision of over 2800 hours of district-based professional development in math and science. Well over one-fourth of all math and science teachers in area districts received intensive professional development focused on mathematics and science content and pedagogy.

In addition, regular meetings with associate superintendents for Curriculum and Instruction allowed MSP district directors to influence both fiscal and human resources necessary to the success of MSP. A continuing challenge in Year Four will be to get district leaders to spend significant time in classrooms observing and analyzing teaching and learning so that professional development and fiscal resources are focused on the goals of MSP.

Objective 2.3: Engage parents and community to support mathematics and science reform.

Beginning-of-school-year sessions at district offices with parent educators and liaisons was the launching point for Year Three MSP parent engagement activities, which served to reinforce El Paso

MSP goals as well as our commitment to parents as major stakeholders. Major training of sessions at UTEP included: “Got Science?,” a hands-on training for K-12 parents that was facilitated with the participation of UTEP engineering students; “Middle School Parent Prep--Expectations and Projections in Math & Science;” “The Middle School/High School Parent Seminar—Focusing on Critical Courses for Student Success;” with the participation of school counselors; and “Summer into Fall Parent Prep Seminar.” The 7th Annual Regional Parental Engagement Conference was held at UTEP in November of 2004 with the participation of over 500 parents. Feeder pattern training sessions were conducted in the rural districts of San Elizario and Anthony. In response to their requests, presentations and workshops were conducted at K-12 school sites throughout the year. The MSP Parent Coordinator also actively participated in schools’ 2005 summer sessions for teachers and parents. Presentations on parent engagement were made to pre-service teacher classes at UTEP and EPCC. In May, 2005 a survey was sent to all middle school and high school parent coordinators to evaluate the parent activities which focused on supporting student achievement, promoting a college-going culture, high-level teaching and learning of math and science, and parents’ role in student success. The surveys will be tabulated by the end of Year 3. Among the lessons learned from Year Three activities are the following: 1) concentrating efforts on reaching and engaging the parent coordinators at each school will accelerate sustainability of MSP goals and objectives beyond the life of the grant; and, 2) the parent engagement program is most effective in engaging parents who traditionally are not involved in their children’s school and education.

During Year Three, there was significant engagement of the local and state-wide community regarding the goals, objectives and activities of the El Paso MSP. First, business and civic leaders, who serve as partners in the El Paso MSP through their role on the board of the El Paso Collaborative for Academic Excellence, engaged in discussions with leaders of K-12 and higher education regarding policy and economic issues associated with improved math and science achievement. Attention to engaging the local community also occurred through the publication of opinion pieces in the *El Paso Times*, authored by the El Paso MSP PI, that addressed key issues and sought to garner community support for improved achievement in math and science. Additionally, representatives from the El Paso MSP were present at local education forums, such as *Leadership El Paso*, where they presented relevant educational data and the strategies being implemented by the El Paso MSP. Finally, the El Paso MSP was represented on the Coordinating Board of the Texas Business and Education Coalition, which includes educators, civic and business/industry representatives from across the State in addressing policy issues and strategies toward improving student achievement.

While the El Paso MSP has improved outreach and communication through the enhancement of its website, the Partnership did not accomplish its intention to publish a community-wide newsletter. However, in Year Four, a semiannual communication outlining progress toward MSP goals, will be included in the El Paso MSP website.

II.3 Key Element Three: Aligning Curriculum, Instruction, and Assessment of Mathematics and Science Education

Objective 3.1: Fully align high school college-preparatory mathematics and science courses, including Algebra I, Geometry, Algebra II, Biology, Chemistry and Physics to meet state and national standards, as well as college/university expectations and assessments, so as to ensure success in rigorous college math/science courses.

Objective 3.2: Fully align PreK-8 mathematics and science curricula with newly redesigned high school courses to develop a seamlessly aligned math/science teaching and learning program, PreK-16.

Continuing the work from years one and two of MSP, the K-16 Mathematics Working Group and the K-16 Science Working Group involved K-12 teachers from both urban and rural district schools, and postsecondary faculty from the Community College and University working together to write mathematics and science curriculum frameworks. With the completion of Algebra I and II, Geometry, and K-8 mathematics, the mathematics group will complete the framework for high school precalculus

during Year Three. In addition, the mathematics group has been working on a suggested syllabus to incorporate into the Algebra I curriculum frameworks. Two of the major districts have used the K-8 mathematics frameworks to develop their syllabi for the year and to prepare for State assessments. The science group completed a review of Chemistry curriculum frameworks, which was fully drafted in Year Two and continued work on K-8 science frameworks. Completing curriculum frameworks for high school Physics this summer will give us K-8 science aligned to high school Chemistry and Physics. In Year Four, we will continue to provide more professional development to strengthen teachers' use of frameworks.

To develop the aligned Algebra II Exam, an Algebra II Assessment Working Group was convened. One teacher from every high school in the region was invited along with postsecondary mathematics faculty from EPCC and UTEP. At numerous meetings during the year, they wrote assessment items for Algebra II at the different cognitive levels. Phil Daro, Executive Director of the Public Forum on School Accountability, and David Webb, of the University of Wisconsin at Madison, who is the Director of the Freudenthal Institute in the United States, were brought in to work with the group. A blueprint for the exam was agreed upon and over 200 items were written and revised by both internal and external writers and consultants. In May, we developed and piloted 6 forms of exams in 44 classrooms in 8 schools from both rural and urban districts, and 7 classrooms at UTEP and EPCC involving 15 teachers and postsecondary faculty, and over 1,000 students. In September, validation experts will be brought in with all teachers who piloted the exam, together with the Assessment group, to validate items. After the validation, we will develop two exams, one for Spring 2006 and another for Spring 2007.

Objective 3.3: Make recommendations to local school districts, Community College, and University regarding policies affecting mathematics and science curriculum and instruction.

As part of the broad MSP agenda, discussions have taken place during Year Three aimed at encouraging and promoting policies, guidelines or other directives affecting mathematics and science curriculum and instruction alignment, teacher preparation, student academic support and postsecondary math placement. Among the specific activities that have taken place over the past year are discussions with the university provost regarding approaches toward ensuring alignment of university courses with the K-16 math/science frameworks; meetings with the university provost and math department chair regarding alternatives to current math placement policies and procedures at UTEP; meetings with community college president and vice-president and the university provost toward identification of new policies and strategies to recommend to all MSP partners, regarding the large numbers of students testing into remedial mathematics. While these activities have stopped short of recommending specific policy language, the discussions are critical elements in ensuring that problems, and potential solutions, related to these issues are kept on the agenda of area education leaders. In addition to the postsecondary level work, meetings and discussions with K-12 leaders have led to the adoption of math and science scope and sequence documents, based on the MSP frameworks that define the topics and content to be taught in math/science classrooms. In a related action, district directives have also clearly specified the curricula that are to be used—and those that are prohibited—toward ensuring high level math and science learning among all students.

EPCC administrators from the president, vice president for instruction, to the deans strongly support MSP, its goals and MSP faculty. They are all working to ensure that placement tests are fully aligned with high school curricula, as well as to make it more likely that students take placement tests while in their last year of high school. Because of the high number of freshman placing in remedial mathematics, the College, in strong partnership with urban school district superintendents, the Director of the Education Service Center for Region 19, the University and the Collaborative are developing ways to get more high school graduates prepared to enroll and complete college level courses without needing remediation. With MSP goals in mind, they are collectively giving attention to what aligned mathematics courses students are enrolling in, and how counselors might encourage more students to enroll in college preparatory courses up to and including their very critical 4th year of high school.

Objective 3.4: Integrate PreK-16 Alignment with postsecondary educators, including math/science teacher educators in EPCC.

In Year Three, EPCC increased faculty involvement in MSP. Eleven MSP math/science faculty are now participating directly in developing course frameworks for their specific discipline. They completed draft frameworks for two mathematics remedial courses, College Algebra, two Physics courses, two Chemistry courses, two Biology courses, and Geology. More courses were developed than planned because faculty identified key content courses in mathematics and science in teacher pre-service programs. Using the same matrix structure used for K-12 curricula, faculty mapped topics to cognitive demands, and state and national standards. This recognition of K-12 standards will provide connection and scaffolding for students in teacher preparation courses. In addition, comprehensive alignment of content to cognitive demands has been a valuable tool for adjunct faculty teaching these courses. To understand and use research on learning, faculty participants attended monthly meetings during the academic year to read and have focused dialogue on selected books and articles, including *How People Learn*, (NRC/NAP, 2000), while writing their frameworks. Many of the new findings in cognition and methodology were folded into the frameworks. In Spring 2005, MSP faculty began meeting both by discipline and by campus. As a way of disseminating and sustaining their work, they held four workshops for faculty during EPCC's Faculty Development Week, presenting and demonstrating examples of how cognitive demands unfold in mathematics and science lessons. Faculty not directly participating in MSP had opportunities to attend retreats during Fall 2004 and Spring 2005. Retreat speakers presented and engaged faculty in successful methods used to teach for understanding. At the suggestion of the National Science Foundation, these retreats were offered to adjunct faculty. Fifty percent of the attendees during the Fall 2004 retreat were adjunct faculty and over 75% of the attendees of the Spring retreat were adjunct.

Objective 3.5: Integrate PreK-16 alignment with postsecondary educators, including math/science teacher educators in UTEP's College of Science.

In Year Three, the College of Science formed an educational compliance committee comprised of nine faculty members and the secondary certification advisor for the college. That committee was chaired by Associate Dean, Nancy Marcus. During the 2003-2004 academic year, this committee met weekly for a year to align course content and instruction in math and science for courses required of pre-service teachers with the current frameworks and standards. The results of this work were then disseminated to department chairs who were charged with informing their faculty.

This year, spurred in part by pass rates of pre-service teachers on the math portion of the TexES examination, the Math department formed its own course alignment committee to examine existing degree programs for pre-service mathematics teachers in order to determine if the programs' required courses adequately prepared the pre-service teachers to pass the state certification exam and be successful public school teachers. The committee members include: Drs. Hamide Dogan-Dunlap, Larry Lesser, Mourat Tchoshanov, Matthew Winsor, and Ms. Tuesday Johnson. The committee examined the TexES standards and competencies and the TexES practice exam to determine the content for which pre-service teachers would be responsible. The committee then studied the UTEP courses to determine alignment between the content taught in the courses and the content found in the TexES standards and exams. The committee found that the secondary (grades 9-12) pre-service degree program was basically solid. Some deficiencies in the area of probability and statistics were found, and a resolution to this problem is under discussion. During the summer of 2005, the committee plans to review the mathematics program for grades 4-8 pre-service teachers.

To help make faculty aware of science and math knowledge and competencies required of pre-service teachers, a Frameworks workshop, focused on understanding a categorization of cognitive demands on students, was conducted by Lucy Michal from the El Paso Collaborative for Academic Excellence in August, 2004. Over 35 College of Science faculty members attended the workshop, including Interim Dean, Dr. Michael Eastman.

II.4. Key Element Four: Increasing College-Going Rates

Objective 4.1: Implement the THINK COLLEGE NOW Initiative.

To improve students' chances to succeed in college, the THINK COLLEGE NOW initiative emphasizes the importance of student enrollment in rigorous academic programs during high school, and is informed by studies which show that students who take rigorous high school programs do better in college courses and are more likely to complete a college degree. In addition, students who take higher level courses are less likely to enroll in remedial classes during their first year of college. This is important and consistent with the MSP's priorities to ensure that students are better prepared for success in higher education. The THINK COLLEGE NOW initiative is an integral part of MSP in that it provides substantive evidence to the entire school community (students, faculty, parents, and the outside community) that encouraging middle and high school students to enroll in higher level math and science courses will increase their chances of college enrollment and completion, and their chances of STEM careers.

Through Texas Scholars—one of the two initiatives under THINK COLLEGE NOW—volunteers conduct presentations that focus on the importance of preparation for college, promote the Recommended High School Program, and enrollment in high-level math and science courses. This year, however, marked the first year in which the state of Texas designated the Recommended High School Program as the default curriculum for all high school students, starting with the class of 2008. Due to this change in state policy, the THINK COLLEGE NOW—Texas Scholars presentations have placed a greater focus on informing the students of going beyond the Recommended program and making sure that they enroll and do well in high-level math and science courses, as well as participating in Advanced Placement courses and dual-college credit courses offered by their schools. This increased emphasis on math and science will result in a separate THINK COLLEGE NOW—Math and Science presentation that can be delivered, during Year 4, by volunteers who work in any of the STEM careers. The Texas Scholars program continues to recruit and train business leaders and other community representatives in the El Paso region to deliver presentations to all 8th and 9th grade students. During the first eight months of MSP Year Three, 138 business and community volunteers, and 95 college students were trained in Texas Scholars

Objective 4.2: Implement MSP Counselors' Initiative: Creating College-Going Pathways.

The El Paso MSP was successful in carrying out Year Three priorities identified under Objective 4.2 by focusing on strengthening support for counselors in guiding students toward postsecondary opportunities. Rather than engage a separate advisory group as outlined in the strategic plan, the El Paso MSP built upon the progress already underway through the region-wide group of district counseling directors, who along with representatives from Region 19 and UTEP, meet monthly to identify shared priorities and plan region-wide activities. The group engaged actively in discussions with El Paso MSP staff regarding shared priorities in their districts and the region. Among the topics addressed, for example, was the implementation of efforts associated with THINK COLLEGE NOW-Texas Scholars Program, and planning for a region-wide El Paso MSP-supported conference in the Fall.

The conference brought over 120 middle and high school counselors to UTEP for a full-day session that focused on the counselor's role in promoting academic success and preparing students for higher education. Patricia Martin, Assistant Vice President at the College Board's National Office for School Counselor Advocacy, provided a keynote address that concentrated on the key role counselors play in facilitating instructional reforms and accountability at their school. She emphasized both the intended and unintended impact that counselors bring to students' decisions regarding preparation for college through enrollment and success in mathematics and science courses. During the session's lunch break, Dr. Martin also led a discussion with middle and high school principals regarding ways in which they can facilitate the effectiveness of counselors as partners in the school's efforts to prepare students for postsecondary education. Practical information was also provided by a representative from the Texas Higher Education Coordinating Board who addressed state updates regarding postsecondary admissions and financial aid, and by testing directors at UTEP and the El Paso Community College regarding

mathematics placement requirements at those institutions. In addition, opportunities for counselors' engagement beyond the Fall session occurred through follow-up sessions within their districts and with UTEP and EPCC partners, regarding the plans they outlined in their action agendas.

Objective 4.3: Implement and Support the Infinity Project

The goal of this activity is to prepare more high school students for college level mathematics and to increase the number of students interested in pursuing engineering degrees via the implementation of a high school math/engineering course. While this course has been effectively implemented in high school classrooms across MSP districts through Year Three of MSP, support for the initiative can now be provided by the College of Engineering. Thus, as of Year Four, this objective will be eliminated as El Paso MSP has achieved sustainability of this activity ahead of schedule.

II.5. Key Element Five: Implementing a research agenda that advances knowledge and understanding about the systemic improvement of mathematics and science education.

Objective 5.1: Develop math/science, field-based, research pedagogical Laboratories (RPL)

The goals of the work in the field-based research pedagogical laboratories are basically two-fold: 1) to provide professional training and guidance in integration of content and methodology based on research for math and science teachers; and 2) to produce original research results that contribute to improvements in teaching and learning in the math and science classrooms. All of the action steps proposed under this objective are moving forward in a rich and complex environment of professional development and research activities.

In the original proposal, work under objective V.1 was to take place in six specific "RPL" schools. However, as new faculty were hired with varying research interests and the needs of teachers and administrators changed, the work evolved, such that it is most easily sorted into four categories:

- 1) *Major RPL Schools* – these are schools with larger-scale research projects and professional development activities underway that involve multiple UTEP faculty members and graduate students. These schools are Andress High School, El Dorado High School, Henderson Middle School, and Wiggs Middle School. All of these are among the six originally proposed, RPL schools.
- 2) *Satellite RPL Schools* – these are schools where a few smaller, independent research projects are underway. Generally speaking, these projects owe their origin to a teacher or administrator approaching UTEP faculty and asking for RPL activity in their school. Schools that fall in this category include Hornedo, Ranchland, and Ysleta Middle Schools.
- 3) *Action Research Projects by MAT Students / NOYCE Scholars* - A large number of Action Research Projects are either completed or underway under the auspices of the research requirement in the MAT programs and through a separate NSF Noyce Scholars grant. All of this work is guided by UTEP faculty. While these are primarily professional development activities, they are contributing to a larger research base, through meeting presentations and peer-reviewed publications.

The impact of these projects has affected approximately 15 different schools, more than 100 teachers and MAT students, and over 9400 students in the schools. We estimate that UTEP faculty members have spent approximately 2200 hours both at the school campuses and at UTEP working with teachers and carrying out data analysis. Graduate research assistants have spent another 1800 hours on these projects over the course of the academic year.

Objective 5.2: Provide research training to MSP math and science staff developers and district directors.

The purpose of this objective was twofold: to build the capacity of staff developers to become more reflective practitioners, and to provide them with research training modules for use with teachers. Training on the principles of scientific research and the importance of action research to the knowledge base was provided in Year Two of MSP. In Year Three, the staff developers used this information to encourage and recruit math and science teachers to participate in Objective 5.3: the awarding of action

research grants to individual and/or teams of math and science teachers. In addition, the staff developers worked with interested teachers to ensure that the action research projects were related to the ongoing MSP activities in their schools and classrooms.

Objective 5.3: Award small research grants to teachers for classroom research.

In Year Three, the Center for Research on Educational Reform (CRER) awarded the second round of MSP Action Research Grants for Teachers. In addition to funding new classroom research projects, this year CRER awarded "follow-up grants" for a select group of last year's recipients to replicate or extend their research. The idea for "follow-up grants" developed out of the meeting last June between NSF Site Visit Team members and recipients of the MSP Action Research Grants for Teachers. Recipients discussed ideas for possible future studies with team members, and El Paso MSP created an opportunity for teachers to receive funding for follow-up research seemed appropriate. Thus, 13 awards totaling nearly \$40,000 were presented to 9 new classroom research projects (approximately \$4000 each; please note that 10 new projects were selected, but one recipient declined the award) and 4 follow-up research projects (approx. \$1000 each). Teachers work individually or in pairs on their projects. This year's 18 teacher-researchers include 10 math and 8 science teachers; 15 high school and 3 middle school teachers; 12 women and 3 men; and, 12 Latinos, 2 Anglos, 1 Asian-American, and 1 of another ethnicity. In November, CRER hosted its first annual research colloquium where follow-up research grant recipients presented their projects and plans for continuing their work. This provided an opportunity for new recipients to learn from more experienced teacher-researchers.

A university faculty mentor with expertise in math or science supervises each project. Teachers meet with Dr. Penelope Espinoza, CRER Assistant Director for Research, and their mentors to discuss the status of their work, and they submit progress reports. In late August, teachers will submit a final report of their research to CRER and present their findings at the next research colloquium in September 2005.

In July and August, CRER will solicit proposals (both for new and follow-up projects) for the third round of action research grants (see Year Four Implementation Plan). Currently, we are exploring the possibility of adding an interview component to the selection process. This would allow prospective mentors to discuss with teachers how they might refine or enhance their proposed projects. Proposals will be selected for funding that allow for the most productive collaboration between the teacher-researcher and faculty mentor. Presently, teachers are concluding data collection and starting data analysis. Their projects concentrate on a variety of issues related to improving math/science teaching and learning. The recipients were featured in local newspapers and the CRER website.

Objective 5.4: Implement a well defined research and evaluation agenda that provides evidence of El Paso MSP progress and success.

In Year Three, a thorough and ambitious research agenda was developed for El Paso MSP. The process through which this agenda was defined illustrates El Paso MSP's commitment to the Partnership. Two planning meetings were held in the summer and fall of 2004. The first was held August 18-19, and was led by Drs. Susana Navarro and Alicia Parra, Executive and Deputy Directors of the El Paso Collaborative, and Dr. Arturo Pacheco, director of the Center for Research on Education Reform. Participants included Lucy Michal, Michele Wells, and Joanne Bogart, the three directors from the El Paso Collaborative; Dr. Penelope Espinoza from the Center for Research on Education Reform; Alicia Torres, the MSP District Director for the area's largest school district; and three Post-Secondary faculty including UTEP's Chair of the Mathematics Department, Dr. Helmut Knaust, the UTEP chair of the Physics department, Dr. Jorge Lopez, as well as EPCC Vice President Dr. Dennis Brown. Together, these internal key players came up with critical attributes, key elements, claims, evidence, and questions related to each of the National Science Foundation's five Key Features and El Paso MSP's action agenda. At the conclusion of the meeting, several critical questions were prioritized and became the starting point for a second meeting, held September 8-9. This subsequent gathering included not only the aforementioned internal key players, but also several external key players that served as "critical friends." They included Tom Corcoran, co-director of the Consortium for Policy Research in Education (CPRE);

Kay Merseth, Director of Teacher Education at Harvard University; Brian Lord, from Education Development Center, Inc.; and, Brenda Turnbull, from Policy Studies Associates.

With the advice and input provided at the second planning meeting, the initial draft of the research and evaluation agenda was developed. The El Paso Research and Evaluation Plan was submitted to NSF in late September, 2004, and was accepted by NSF the following month. The plan included a set of eight research studies designed to advance our knowledge and understanding about the systemic improvement of mathematics and science education. The direction and implementation of the research studies has been divided among several organizations, including the Consortium for Policy Research in Education, Policy Studies Associates, and the UTEP Center for Research on Educational Reform (CRER). The following is a brief synopsis, and progress to date, of the five research studies that are being conducted by CPRE and PSA, followed by the three research studies being conducted by CRER.

A. Study of High School Sustained Effects

The purpose of this study is to investigate the lasting effects of several El Paso MSP strategies on teaching practice, curriculum, communities of professional practice and leadership in high schools once the MSP staff developers move to middle school. Policy Studies Associates (PSA) has taken charge of this study and has completed the first phase, which included the administration of an online survey to teachers, principals, and department chairs. (See Year Three Evaluation Report.)

B. Impact of MSP Initiatives at the Middle School Level

This study will investigate the impact of MSP Staff Developers on instructional practice and student performance at the middle school level. The research team at CPRE, in collaboration with the Collaborative, will be responsible for the implementation of this study. The design and methodology for the study have been finalized, and will include staff developer daily logs and interviews, teacher and principal surveys, classroom observations, measures of content knowledge and measures of student performance. (This study will begin in Summer, 2005.)

C. The Effective Coach Study

This study, also to be conducted by the CPRE research team, will focus on the work of the staff developers. In partnership with the instructional coaches working with the Merck Institute for Science Education, guidelines will be developed focusing on two or more problem areas in both mathematics and science, and will be piloted to measure their effectiveness in providing coaches with increased capacity for diagnosis of problems, suggestions for interventions with teachers, and tools for working with teachers to examine and assess problem areas. (This study will begin in Summer, 2005.)

D. A Case Study of the El Paso MSP K-16 Partnership

Policy Studies Associates will be in charge of investigating the extent to which the culture of the MSP partner institutions has changed over time in this case study of the EL Paso MSP K-16 Partnership. It will also look into ways in which engagement changes over time, and the challenges and benefits encountered throughout the life of the partnership. Through interviews with key participants, observations of board meetings, and review of minutes from meetings, this case study will contribute to the understanding of how partnerships develop and the necessary ingredients for a successful partnership. (See Year Three Evaluation Report.)

E. Study of School Principal Leadership Development

This third study to be conducted by PSA will identify and track changes in principals' instructional leadership in response to the activities of the El Paso MSP. Three surveys were developed for the high school in January and were also administered this spring. Several focus groups were conducted this spring, and included two groups of principals, two of science teachers, two of math teachers, and three of staff developers. (See Year Three Evaluation Report.)

The Center for Research on Education Reform Studies

The Center for Research on Education Reform is responsible for the three following studies, which are interconnected and related to the impact of MSP and its activities on the culture of the university as a partner, and STEM departments in particular. The studies focus on measuring, over time, the degree and level of engagement of STEM faculty with K-12 partner schools, teachers, and administrators, as well as the impact of the MSP MAT programs. The progress during Year 3 on the three studies is described below:

F. Study on Culture Change in Postsecondary Education

A survey to collect baseline data from STEM faculty and administrators in the College of Science was administered in the spring of 2005, and the surveys are being analyzed in the summer of 2005. This will constitute a portion of the baseline data for the study. In addition, a number of STEM administrators and faculty members were initially interviewed as an aid in development of the survey. In the late summer and early fall, full-fledged interviews and focus groups of faculty members and administrators (department chairs and deans) will take place. The quantitative and qualitative data from the surveys and the interviews will be analyzed in the fall of 2005 to form a composite picture and description of the faculty culture in the departments of the College of Science, with regard to engagement with K-12 schools, teachers, and administrators, as well as with teacher preparation and the professional development of teachers. Similar data will be collected and analyzed in Years 4 and 5 of the MSP project to see if there are any significant changes in the culture over time as a result of MSP interventions.

G. Targeted Descriptive Study of the Ways that Postsecondary Faculty are Engaged in the MSP Partnership and Work with K-12 Schools and Teachers

The purpose of this targeted study is to develop an inventory of STEM faculty engagement in direct teacher preparation and other activities with the public schools and their teachers. A survey was distributed to all faculty members in the College of Science in the spring of 2005. The survey contains items to determine the type, the level, and the degree of engagement of STEM faculty in a variety of K-12 activities, including teaching, curriculum development and alignment, school presentations, research, mentoring of mathematics and science teachers on research projects, and other activities. The survey data is currently being analyzed (summer of 2005). The data collection will be replicated in Years 4 and 5 of MSP to see if there is an increase in levels of engagement among STEM faculty.

H. Targeted Study on the Impact of MAT Degree Programs in Mathematics and Science on the Teaching Practice of Graduates

One of the planned MSP interventions has been the development of two new MAT degree programs in science (physical science and life science) and the revision of an existing MAT program in mathematics. This study attempts to gauge the impact of the new MAT programs in math and science in terms of changes in the graduates of the program with regard to their content knowledge, their pedagogical content knowledge, and resulting changes in their classroom practice. A survey has been developed for the first cohort of MAT students who finish their two year program of study in the summer of 2005. The analysis of the data from this survey will be used to develop a survey for two incoming cohorts of students—one in mathematics and one in life sciences. This survey will be administered to members of the new cohorts as they enter the MAT program in August of 2005. In addition to data from the surveys, math and science teachers in the program will be interviewed and assessed in terms of content knowledge, and pedagogical knowledge, and classroom observations will be made (fall of 2005). This will constitute baseline data. Similar data will be collected at the end of Years 4 and 5 of MSP.

Summary of Strategic Plan Changes

In the above narrative and attached Implementation and Goal Matrices, El Paso MSP has reported changes in the following:

Revised Objectives:	1.2
Eliminated Objectives	1.4; 4.3; 5.2
Revised Benchmarks	1.2; 1.3; 1.5; 1.6; 1.8
Eliminated Benchmarks	1.4

III. QUANTITATIVE DATA: STUDENT ACHIEVEMENT AND TEACHER QUANTITY, QUALITY AND DIVERSITY

This section of the report provides El Paso MSP student achievement data and other data that measure the effectiveness of the MSP Partnership. Data relative to the following are presented in this report:

- K-12 Mathematics and Science Student Performance on the Texas Assessment of Knowledge and Skills (TAKS);
- Course enrollment and completion in secondary, college-preparatory mathematics and science courses;
- High school graduation and college preparation rates;
- SAT participation and performance;
- Postsecondary course placement in mathematics;
- Mathematics and Science Teacher Preparation.

K-12 Student Achievement Data

The primary indicator of student performance in mathematics and science, K-12, for El Paso MSP is the Texas Assessment of Knowledge and Skills (TAKS), administered for the third year in 2004-2005. In each of the first four years of the State's administration of the TAKS assessment, which was first administered in 2002-2003, standards for the percent passing are being increased yearly. (In 2004/05, the passing standard reached the highest level for grades 3 through 10. In 2005/06, the grade 11 passing standard will move to the highest level.) This means that, because the standard is changing yearly, year-to-year comparisons of the percent of students passing do not provide true measures of improvement. For that reason, El Paso MSP will provide data showing how performance has changed from year to year, relative to each of the three standards that have been in place each of those years. Thus, we will present TAKS performance for this year, against the 2002/03 standard, the 2003/04 standard, as well as against this year's standard.

Mathematics

Review of Table 1 (below) reveals that the percent of students passing TAKS, under the current, as well as the last two years' standards, has increased significantly. As is clear from review of the data, performance has improved quite consistently over the three years and the three different standards. The highest percentages passing occur at the third through fifth grades and at the 11th grade. Even under the more rigorous standard this year, between 73 and 79% of students passed all portions of the test. Thus the year three benchmark that at least 70% of students would pass TAKS math, was met for grades 3,4,5, and 11, but not for grades 6 through 10. The greatest increases in the percentage of students passing at this year's standard occurred at grades 5, 10 and 11, where increases exceeded 5 percentage points.

Table 1

El Paso MSP TAKS Mathematics Percent Passing in MSP—Years One, Two and Three									
Grade	2002—2003 Standard			2003—2004 Standard			2004—2005 Standard		
	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing
3	89	96	93	81	89	88	69	80	79
4	85	91	93	76	84	86	65	75	78
5	84	87	91	74	78	84	62	67	74
6	72	76	79	62	69	71	50	58	62
7	67	72	76	55	62	64	42	51	53
8	65	68	67	53	58	58	41	47	48
9	51	60	66	40	50	55	30	40	45
10	62	67	70	47	53	58	33	40	47
11*	55	79	84	55	79	84	40	68	73
Standards	2 SEM – All Grades			1 SEM Grades 3-10; 2 SEM Grade 11			Panel Grades 3-10; 1 SEM Grade 11		

Source: Region 19 Summary Report, Texas Education Agency.

*The Standard for 11th Grade remained the same from AY 2003—2004 to 2004—2005.

As is also clear in the data, challenges in mathematics performance on the TAKS remain. While at the lowest standard (2002/03) at least 65% of students in all grades passed the test this year, and at four grade levels 84% or more passed the test, at the highest standard, less than 62% of students in grades 6 through 10 passed. Performance in grades 8, 9, and 10 is the lowest of all the grades and suggests the need for careful analysis of the level of preparation of those students at the higher conceptual levels.

Student difficulty responding to the highest TAKS standard this year is also evident in math achievement data by ethnicity. Table 2 shows that the gap between Hispanic and White students is smallest at the third grade (7.9%) and increases steadily through grade ten (26.2%), declining again at the eleventh grade to a gap of 13.5%. Since last year, the gap has grown—on average, by 2 percentage points. The growth in the gap suggests that while Hispanic students may perform close to the level of Whites on lower level math material, they may be prepared at levels lower than White students on the higher level material.

Table 2

El Paso MSP TAKS Math Data, 2005					
Passing Rates by Ethnicity and Gaps Between Hispanics and Whites					
Grade	Ethnicity			Total	Gap Between Hispanics and White
	Hispanic	White	African American		
3	78.8%	86.7%	69.4%	79.4%	7.9%
4	77.3%	88.6%	69.3%	78.3%	11.3%
5	73.2%	84.4%	65.1%	74.1%	11.2%
6	60.7%	75.1%	53.9%	61.8%	14.4%
7	51.6%	68.7%	49.8%	53.2%	17.1%
8	45.5%	65.8%	46.0%	47.5%	20.3%
9	42.5%	65.1%	34.5%	44.6%	22.6%
10	44.0%	70.3%	38.5%	46.8%	26.2%
11	71.9%	85.4%	65.6%	73.3%	13.5%

Source: El Paso Collaborative for Academic Excellence Analysis of Texas Education Agency Data

Science

Performance on TAKS Science also showed consistent increases over the three years and the three standards. All students have made impressive improvements across the years, with the percentage point increase generally greatest at the highest 2004-05 standard. For example, while 81% of fifth grade students passed the test this year at the lowest standard, the increase from the first year of testing at that standard was only 12 percentage points. By comparison, though only 57% of fifth graders met this year's higher standard, the increase over 2002-03 performance at that standard is almost 30 percentage points. A similar increase in the performance of eleventh grade students resulted in 72% of students passing the test at the higher standard this year.

Table 3

El Paso MSP TAKS Science									
Percent Passing in MSP—Years One, Two and Three									
Grade	2002—2003 Standard			2003—2004 Standard			2004—2005 Standard		
	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing	2002-2003 %Passing	2003-2004 %Passing	2004-2005 %Passing
5	69%	79%	81%	49%	62%	71%	29%	45%	57%
10	59%	68%	70%	43%	53%	54%	29%	38%	38%
11*	56%	77%	83%	56%	77%	83%	44%	66%	72%
Standards	2 SEM – All Grades			1 SEM Grades 3-10; 2 SEM Grade 11			Panel Grades 3-10; 1 SEM Grade 11		

Source: Region 19 Summary Report, Texas Education Agency.

*The Standard for 11th Grade remained the same from AY 2003—2004 to 2004—2005.

These data, as well as the data in the following table showing performance by ethnicity, however, also reveal worrisome aspects to the achievement picture in 2005. With the exception of science performance at the 11th grade, achievement at the other two grade levels is unacceptably low. The 38% passing rate at grade 10 is of particular concern. Moreover, gaps between Hispanic and White students have grown as the passing standard has been increased. The smallest gap of 20.3 percentage points is at the 11th grade while the largest, fully 33 percentage points, occurs at the 10th grade level.

Table 4

El Paso MSP TAKS Science Data, 2005					
Passing Rates by Ethnicity and Gaps Between Hispanics and Whites					
Grade	Ethnicity			Total	Gap Between Hispanics and White
	Hispanic	White	African American		
5	54.1%	77.8%	54.7%	56.6%	23.7%
10	34.6%	67.6%	36.4%	38.3%	33.0%
11	69.6%	89.9%	72.2%	72.0%	20.3%

Source: El Paso Collaborative for Academic Excellence Analysis of Texas Education Agency Data

Course Enrollment and Completion

Since the beginning of the El Paso MSP, partners have been focused on increasing the numbers of students enrolled in college preparatory math and science courses. In year three of MSP, huge gains in the proportion of students enrolling and passing those courses were seen, resulting in over 80% of all secondary students in El Paso MSP enrolled in Algebra 1 and 2, Geometry, Biology and Chemistry (see Table 5.). Most noteworthy among these increases is the growth from 79.6 % of students enrolling in Algebra 2 by the 11th grade last year, to 92.6% this year, and the increase from 24.4% to 29.5% in the percent of students taking physics from last year to this. As might be expected with the larger enrollment rates, pass rates have declined, but only slightly.

Table 5

Math/Science Course Enrollment and Pass Rates					
El Paso MSP Districts					
2003-04 Academic Year					
		Hispanic	White	African American	Total
Algebra I*	Enrolled	94.7	96.0	91.9	94.7
	Passed	87.4	92.9	86.4	87.9
Geometry**	Enrolled	84.4	98.6	95.3	86.1
	Passed	84.9	92.0	86.1	85.8
Algebra II***	Enrolled	93.9	85.3	79.3	92.6
	Passed	87.9	91.9	89.0	88.4
Biology**	Enrolled	92.2	87.6	97.2	91.8
	Passed	83.2	90.0	84.1	84.0
Chemistry***	Enrolled	81.1	78.6	76.4	80.7
	Passed	85.0	91.1	86.4	85.8
Physics	Enrolled	27.5	39.5	38.4	29.5
	Passed	95.1	98.0	95.8	95.6

*By End of Grade 9

**By End of Grade 10

***By End of Grade 11

Source: Calculations based on data provided by Region 19 from the Public Education Information Management System.

High School Completion and Preparation for College

During Year Three of MSP, graduation rates among students across all MSP districts increased and reached an all-time high. Fully eighty percent of El Paso students graduated from high school, with the greatest improvements occurring among rural students. Among those students, during Year Three, an almost ten percentage point increase in graduation rates, to 77%, was noted over the previous year. Similarly, increases occurred in the percentage of MSP students completing the State's Recommended High School Program. In comparison to last year's rate of 83% completing the college-preparatory program, this year over 90% of graduates had completed the rigorous set of courses. Thus, the year three benchmark that 75% of high school graduates would complete the Recommended High School Program was not only met, but greatly exceeded. Again of note, is the significant increase in the percentage of rural graduates who completed the course of study.

SAT/ACT Participation and Performance

In 2004, almost 1000 more students in El Paso MSP urban districts took the SAT or ACT tests. Despite the very large increase in test takers, scores on both tests increased. While the increases are very slight, and the overall scores still too low, they are of importance as they indicate a reversal of a trend of declining performance.

Mathematics Placement at UTEP and EPCC

The performance of students taking math placement tests upon entry into UTEP or the El Paso Community College has long been an indicator of importance to the MSP partnership. For that reason, we identified as one of our benchmarks for year three that 70% of students at UTEP would place into college-level mathematics, versus remedial math, and that 50% of EPCC incoming freshmen would do so. During Year Three of MSP, the UTEP benchmark was met, and even exceeded slightly. As of fall 2004, 72% of incoming freshmen tested into college-level mathematics, up from 55% in 2002. Unfortunately, EPCC data show that the percentages are almost exactly reversed at EPCC. There, only 28% of students test into college-level math, while 72% are required to take remedial math courses, meaning that the year 3 benchmark was not met at EPCC. The problem has been of such concern that EPCC and the MSP partnership have convened groups of K-16 leaders to discuss the problem and develop a plan for improvement.

Mathematics and Science Teacher Preparation

In Year Three of MSP, a very large increase occurred in the number of students in mathematics and science teacher preparation programs. A total of 168 students majoring in math or science and minoring in education were enrolled at UT El Paso as of Spring 2005. This represents a 30% increase over 2004 enrollments. Because a large number (72) of these students are seniors, the number of newly certified math and science teachers is expected to increase in the coming months.

IV. MSP MANAGEMENT PLAN

El Paso MSP's PI, Project Director and two of three Co-PIs remained the same during Year Three. Dr. Richard S. Jarvis, new UTEP Provost, has replaced Dr. Steve Riter, former Provost, as Co-PI. Dr. Jarvis brings many years of K-16 experience and leadership, as Chancellor of the University of Oregon and University of Nevada systems, to his new role. An additional change has occurred in the leadership of one of the key MSP partners. Interim Dean of the UTEP College of Science, Dr. Michael Eastman, and Associate Dean, Dr. Kate Miller, have brought new energy and vision to the MSP Partnership.