Narrative of Annual Report to NSF: May 2006

Introduction

Having completed Year Three and having experienced a successful site visit, Southwest Pennsylvania's Math Science Partnership (MSP) qualifies for an abbreviated version of its Annual Report for 2005-2006. This narrative begins with commentary on progress in implementation of the strategic plan. Secondly, brief explanatory remarks note progress on Goals, Outcomes and Benchmarks. The remainder of the narrative is organized around the commitments made by the MSP in its "Response to the Site Visit Report." In particular, given that the project period is now more than halfway complete, the major emphasis is on how the MSP is accelerating its positioning for sustainability.

I. Commentary on Progress on Implementation Plan

Southwest Pennsylvania's Math & Science Partnership is on track with its Implementation Plan. As noted in the "Summary of Progress," all but seven of the hundreds of intended action steps will be accomplished by the end of Year 3. Attesting to the responsive flexibility of the MSP, more than 20 additional actions were also taken, many of which were guided by the Site Visit Report. Exhibit 1 includes a chart summarizing that progress, as well as the entire 2005-2006 Implementation Plan noting the status of each action.

II. Commentary on Progress on MSP Goals, Outcomes and Benchmarks

Exhibit 2 includes a chart summarizing the progress on each goal related to the benchmarks established at baseline, with supporting evidence detailing individual district or IHE progress contributing to the regional progress.

Goal 1: Increase in Student Knowledge as indicated by:

A. Successful Course Completion

The Summary Chart concerning "Successful Course Completion " indicates that, as of 2004-2005, more than half the MSP districts have achieved the ambitious benchmarks for Algebra I , Algebra II, Geometry, and Biology. The range among the district performance in those areas also narrowed. Regional attainment in Chemistry and Physics did not change. However, the detailed district chart clarifies that there is much movement in both directions by districts. Several others whose successful completion rates declined this year are already above the given benchmark. Many districts are making progress, but not yet meeting the benchmark.

B. Achievement of All Students

1. Performance in IHE Courses Revised via MSP Activities

In 75% to 80% of the revised courses that were taught, fewer than 20% students were below proficiency, as reported for 2004-2005 and the fall semester of 2005. The IHE partners are approaching this benchmark via work of Teacher Fellows and faculty

members involved with course revision. A concern of three IHEs is that while multiple sections of courses are taught by multiple faculty members, only one faculty member may work with a Teacher Fellow on course revision. This results in different statistics for certain sections of a course. One IHE partner maintains a 'common syllabus' for each course to counteract this effect.

2. Students Performance on PSSA in Math

- At the 5th grade level, at least half of the districts achieved the benchmark of 75% or more attaining proficiency and fewer than 10% scored below basic. The range among the districts on both measures also narrowed.
- At the 8th grade level, progress was evident, with at least one-quarter of the districts attaining both benchmarks, though there was no narrowing of the range among districts.
- At the 11th grade level, there was a slight decline in districts attaining the benchmarks, with fewer than 10% of the districts achieving them. The range among districts did narrow slightly. This plateau of achievement at the high school level is evident in state and national trends as well.

3. Students Performance on PROM/SE in Science

MSP is for the first time reporting student performance in Science. The benchmark is a comparison of average district performance to the average U.S. performance on common items from the1995 TIMSS.

- At the 4th grade level, there was a slight decline from 2004 to 2005 (from 19 to 17) in the number of districts performing notably higher than the U.S. performed on TIMSS 1995. The number of districts performing about the same or notably higher was unchanged at 32.
- At the 7th grade level, there were declines in the number of districts meeting the benchmarks: four districts (down from 13 in 2004) performed notably higher than the U.S. performed on TIMSS 1995; and 23 districts (down from 27 in 2004) performed about the same or notably higher.
- At the 10th grade level, there were increases in the number of districts meeting the benchmarks: ten districts (up from three in 2004) performed notably higher than the U.S. performed on TIMSS 1995; and 20 districts (up from 16 in 2004) performed about the same or notably higher.

C. Reduction in Disparities in Achievement of Sub-Groups

1. **Districts with Reportable Black Enrollment**

In performance on PSSA Math, slight increases are apparent for 2004-2005. At the 5th grade level, close to one-third (6/17) of the districts have attained the benchmark of 50% proficiency. At the 8th grade level, only 2 districts have attained the benchmark.

The aggregate performance of all Black students In PROM/SE Science in both 2004 and 2005 was notably lower than the U.S. performed on TIMSS 1995, indicating that the MSP is not yet meeting its benchmark of having the aggregate performance of black students reaching the US performance on TIMSS 1995 science items.

2. **Districts with Reportable Economically Disadvantaged Enrollment**
Substantial gains are evident for 2004-2005 in performance on PSSA Math. At the 5th grade level, almost 80% (27/34) of the districts are meeting the benchmark of 50% proficiency, and well over half (19/34) are meeting the benchmark at 8th grade.

No progress is yet evident in meeting the benchmark of 50% of Economically Disadvantaged students meeting the U.S. performance on TIMSS 1995 science items. The aggregate performance of all Economically Disadvantaged students in 2004 and 2005 was notably lower than the U.S. average on TIMSS 1995.

Goal 2: To increase the quality of K-16 educator workforce

MSP is on track to attain most professional development participation benchmarks. In addition to the projected participation are the educators involved in On-site Academies led by Teacher Leaders in the districts in 2004-2005. The two activities not yet meeting benchmarks are Teacher Fellows and Content Deepening Seminars.

A. Teacher Leaders led 106 On-Site Academies in the districts in 2004-2005
While the MSP provided materials for 20 to 30 in-district participants as follow-up to each TLA, the district determined the target group. Of the total 2412 reached, 1313 were via EMTLA, 618 via SMTLA, and 481 via HSTLA. The number of participants in the secondary academies was determined by the size of the math or science departments, and whether they included middle and high school. While the number of the participants in each academy varied from session to session, the median sizes of academies ranged from 10 or fewer (30% of the academies) to 11 to 20 (30%) to 21-40 (25%) to 41 to 110 (15%).

B. All aspects of Content Deepening Seminars were reviewed and refined.
As reported at the Site Visit, in 2004-2005, there had been 194 district appointments to Content Deepening Seminars (CDS) with 91 in math and 103 in science, representing only 21% of the potential appointments. Actual participation numbers (those who registered for the CDS and showed up) numbered only 149. Consequently, nine of the 15 (CDS) in math were canceled due to low enrollment, including one by IHE. In Math, two IHE-led, and 2 MSP staff-led seminars occurred. In science, six of the 18 CDS were canceled, all of those being provided by Partner IHEs.

To analyze root causes, IHE faculty met with MSP Project Directors as a joint Math & Science Leadership Team and a variety of alternative solutions were suggested.

The goals of the CDS were made explicit. MSP Project Directors assisted the IHE faculty in development of the application for Act 48 credit, explicitly stating that no more than five content objectives were to be approached—all of which were to be related to the Curriculum Framework. These objectives were included in the marketing of the seminar. They are also applied in an MSP-developed Content-Focused Assessment

tool, which uses the objectives to solicit "prior knowledge" at the beginning, and at the end, rating of deepened knowledge of content deepening with supporting evidence.

With these proposals in hand, MSP placed emphasis on marketing efforts. In early January, district leadership teams were provided with a listing of topic, provider, timing, and location of the approved CDS. At Network Connections in February, a video promoting the IHE CDS was shown in a plenary session, and each district received a CD copy of the video in a box of popcorn on their Team Table. In April the *Coordi-net* was distributed to all educators with CDS organized by discipline and strand. The CDS were promoted at monthly IU Curriculum Coordinator meetings. All district minimum (2) and maximum enrollment requirements were also removed.

A new easier to use Edu-Link system has been introduced for course registration at AIU. MSP staff are providing Individualized registration assistance to each appointed educator. Instructors can see their enrollment on an on-going basis. Unfortunately, early indications for summer 2006 appointments are disappointing. MSP Cabinet is carefully monitoring the situation, and plans to continue refinement.

C. Teacher Fellows

While lagging behind expected participation, the Teacher Fellow experience is gaining popularity as word of mouth spreads about the experience. Several faculty members worked with a teacher fellow for the first time, and many have agreed to work again with another fellow. To increase the number of Fellows, the MSP opened participation to more than two educators from a particular district which has increased applications.

Goal 3: To create sustainable coordination of partnerships with intentional K-16 feedback loops

A. IHE Course Revision

The work of course revision has developed an appreciation by the IHE faculty member for the expertise and work of the K-12 Teacher Fellow and has allowed the Teacher Fellow an opportunity to participate in the demands of teaching in higher education. Both Carlow and Robert Morris have not had a full complement of Teacher Fellows, which is affecting the number of courses that have been revised to date. All of the IHE have experienced the necessity of teacher fellows changing their original term of participation. This may mean that not all courses will be able to be revised.

B. Sustained Faculty Involvement

While the Benchmark for sustained involvement of at least six faculty members from each IHE involvement is met, there are changes in the individuals participating. The nature of faculty involvement also continues to evolve as detailed on the Faculty Involvement matrix included in Exhibit 2. In addition to working with Teacher Fellows, faculty participation from IHEs included:

- Co-facilitating with MSP Coordinators Teacher Leadership Academies on campus
- Co-presenting with MSP Coordinators at Network Connections

- Working with faculty from other IHEs and MSP staff to plan for the three new Teacher Leadership Academies
- Planning for presentation of Content Deepening Seminars
- Working to fully involve the newly participating school districts in the MSP.

C. K-12 Student Teacher Placements in MSP Districts

The IHEs value the professional development experiences shared by K-12 teacher leaders and IHE faculty including research-based curricula and training by MSP expert partners in the MSP activities. Coupled with course revision efforts, these activities should foster a synergy that would come to life in the student teaching placement. All IHEs have found matching student teachers with Teacher Leaders as Mentors to be very challenging due to the administrative structures and processes in both higher education and the school districts. The IHE Team continues to explore mechanisms to facilitate these placements. K-12 leadership will make this issue a priority in Year 4. However, there have been increases (from 12 to 58) student teachers placed in MSP districts for 2005-2006.

D. IU Partnership is addressed later in the narrative.

III. Accelerating Positioning for Sustainability

A. Develop effective presentation of project

Guided by participation in the National Academies seminar on "Sustainability," the MSP was re-affirmed about the value of a shared vision of effective mathematics and science education as an important criterion to advise sustainability deliberations. During the Site Visit, the challenge of clearly presenting the complexity of the MSP's model of intervention was apparent. Effective presentation of the key components of the MSP activity is crucial to any discussion of what should be institutionalized.

1. Developing a Shared Vision and Belief Statements

The Math & Science Collaborative (MSC) Steering Council and the MSP Cabinet held a joint "Summit for the Future," in late November. To build a shared understanding of their vision of mathematics and science education, they re-visited the original vision and belief statements developed by the Steering Council in 1994. Using the MSP Aims, the Summit suggested modifications. In March and May, as they reviewed subsequent drafts, they used the emerging criteria to (a) consider the requests for regional collaborative action compiled from district team deliberations from Days 2 and 3 of the Leadership Action Academies and (b) make recommendations concerning 2006-2007 sessions for Network Connections, and the content of *Journal, Coordi-net,* and the MSP websites. The latest vision draft will be reviewed by the MSP Cabinet before publication in the fall 2006 *Journal,* and will continue to guide sustainability discussions.

2. Refining Explanation of Key Components of MSP model

The Assessment and Evaluation Team of the MSP (AET) refined the partnership's logic model and proposed characterization of project activities to the MSP Cabinet and IHE

faculty. Included in the Evaluator's report, these descriptions clarify that all MSP interventions are designed to build capacity for positive change within K-16.

a. Refining Explanations for MSP Expansion/Replication

The MSP strategic plan included a planned expansion or replication by additional K-12 districts in Years 4 and 5 to allow application of lessons learned in the first three years. Organizing the "on-ramp" for potential new K-12 district partners required careful consideration of interventions to identify crucial components of accelerating success. The following six components were identified as key to this MSP.

1. Placement of **staff in the Intermediate Units** to coordinate IHE partnership and MSP activities while adding math and science content expertise to IU work.
2. Advocacy for **access and success for all students in coherent and challenging curriculum**
3. Engagement of a **vertical slice of leadership in data-based decision-making** about student achievement and project opportunities
4. **Building of administrative understanding** through active learning experiences
5. Networking and support of **teacher leaders in utilizing research-based tools and strategies** to share with colleagues
6. Building of **on-site learning communities focused on refining practice** by applying research-based tools and strategies

b. Introduction of MSP Expansion for Year 4

The Executive Directors of three core partner IUs requested that the planned expansion occur within their IUs rather than by moving into two outlying IUs as originally proposed. The MSP Cabinet saw the value to sustainability of adding to the critical mass in the core IUs. As the outlying IUs also chose not to make the necessary commitment to sustainability, expanding within the partner IUs was possible within planned funding.

In May 2005, possible MSP expansion was publicized by each of the four partner IUs. Districts were invited to join the Math Science Partnership if they were willing to fully implement the "lessons learned." Because MSP staff recognized that in districts where administrators attended *Lenses on Learning* Seminars, MSP strategies and tools were more effectively employed, interested districts were requested to send three administrators (an elementary, a secondary, and a central administration) to the 2005-06 *Lenses on Learning* (LOL) sessions. This "on-ramp" of LOL participation by an administrative team was undertaken by ten districts from three of the four IUs with none in the IU with the lowest percentage of districts already involved.

Further requirements for becoming a partner were outlined for the administrative teams (which included the superintendents) in a January meeting following their morning LOL session. Six of the ten districts decided to become partners. Each of these districts has submitted a letter of commitment from the superintendent and has appointed teacher leaders to the various academies that are being offered in the summer of 2006.

c. Eliciting of Participant Perceptions of MSP Components

As one step in refining the explanation of the MSP components, the MSP engaged K-12 district participants in describing their perceptions of MSP strategies and tools through the Leadership Action Academy. If not already members of the district Leadership

Team, Teacher Leaders participating in each of the MSP Teacher Leadership Academies were asked to join their team for Day 4 of the Leadership Action Academy.

Meeting with teams from several districts in the local IUs, district educators were asked to discuss and record the tools and strategies acquired through the MSP that helped them to advance student achievement. This experience enabled the vertical slice district Leadership Team to recognize the experiences of the multiple components of the MSP, and to note the commonalities. The experience was evaluated by participants as both productive and enlightening. The saved charts were shared with administrators of the "on-ramp" expansion districts for a preview, in educators' words, of the tools and strategies that their educators would acquire through the MSP experience.

3. Use of External Assistance

The MSP Cabinet agreed to delay consideration of the ***Convening of Advisory Assistance and Reaction Panel*** mentioned in the Site Visit report. The decision was to first explore existing avenues for assistance. As sustainability planning moves forward, the MSP recognizes the importance of having objective, potentially external, advice about messages and strategies. The Cabinet has discussed various audiences, and plans to prioritize them according to their roles in sustaining effort toward the vision. A readily available resource to advise on this issue is the Communications Department of the AIU. In particular, they can identify effective communication strategies, as well as assist with relevant language to reach each audience.

B. **Developing a detailed sustainability plan**

Sustainability for this MSP is seen as institutionalization of commitment to the vision and supportive vehicles for action toward that vision. With a clear, shared vision developed, the MSP is pursuing a three-pronged strategy for sustainability.

1. Integrate an understanding of the vision and support for action into policy level initiatives at the local and state levels.
2. Elicit and articulate the value-added of MSP vehicles, tools and strategies.
3. Integrate goals/work of MSP into on-going work of key stakeholder institutions with careful attention to their unique contexts.

The sections below detail how that strategy has been applied in 2005-2006. First work with (III) the Pennsylvania Department of Education (PDE) is described, followed by work with the core partners in the MSP: (IV) the Intermediate Units, (V) the Institutions of Higher Education (IHEs), and (VI) the K-12 Districts.

IV. Integrating the MSP Vision into Policy Level Initiatives at PDE

This MSP models taking reform to scale by involving 48 local control districts. With an additional six expansion districts, the 54 partner districts involve more than 10% of Pennsylvania's 501 districts. These districts are K-12 systems with relatively small central administrative staff located across a geographic region the size of a small state. Though individually autonomous in definition of curricula, selection of instructional materials, and structuring of course offerings and consequent enrollments, most district

administrative staff are generalists, responsible for all content disciplines—and everything else on the crowded district agenda besides!

With the advent of NCLB, direction from the state Department of Education carries increased import. The MSP works in two ways to leverage PDE for positive change in districts. (A) By directly supporting PDE in an advisory or consulting role, MSP works to integrate its vision and strategies into the policies being developed and recommended to districts. (B) By thoroughly understanding the initiatives coming from PDE, the MSP helps districts respond to and take advantage of those initiatives through their involvement with the MSP. The MSP becomes the cooperative partner helping the districts respond to the PDE directives for teaching and learning.

A. Supporting an MSP Consulting/Advisory Role to PDE

The MSP has experienced several opportunities to integrate the MSP vision and strategies into the work of PDE since its inception in 2003. This relationship evolves, at least partially, out of the 1990s work of the MSC in advocating before the State Board of Education about the adoption of effective standards in mathematics and science. MSC testimony familiarized the State Board with TIMSS 1995. Relationships with PDE staff were built, as evidenced by the Math Curriculum Framework, developed through an early partnership of MSC and AIU, being featured at a Governor's Institute in 2002.

One of the first activities of the MSP was to develop the companion Science Curriculum Framework. The PDE Science Advisor endorsed its development and upon its release in October 2003, provided CD copies to every principal in every school in Pennsylvania. Consequently, during the **development of the Science Assessment and Anchors,** the MSP was invited to appoint representatives to the state-wide review committee.

With the appointment of an early MSP partner as Director of the PDE's Division of Assessment and Accountability, the MSP was confidentially approached in 2004 to review the **match of mathematics assessment items** to the newly designated assessment anchors and grade levels. MSP staff were pleasantly surprised that PDE employed a rubric similar to those suggested for reviewing large-scale assessments by a RETA National Academies seminar on student assessment

In July 2005, Dr. Gerry Zahorchak, Pennsylvania's Secretary of Education, arranged a briefing on the SW PA MSP Principal Investigator, Dr. Nancy Bunt. In September 2005, Dr. Zahorchak approached Dr. Bunt about assuming the directorship of the Division of Teaching and Learning within PDE. While the job offer was not accepted, with permission of the AIU Executive Director, Dr. Bunt agreed to act as an informal consultant to the Secretary. One of her first recommendations was that he read "The Teaching Gap" by Hiebert and Stigler. In December 2005, Secretary Zahorchak invited Dr. Bunt to be a featured presenter of **best practices in math instruction for a PDE Colloquium on Excellence** in Instruction. Dr. Zahorchak had also invited Dr. Hiebert, and had his entire senior team read "The Teaching Gap." Dr. Bunt's presentation, titled, "What are characteristics of good instruction in mathematics?" featured the key elements of the MSP Aims as shared with K-12 districts. Asked to respond to how PDE

could help support such instruction, Dr. Bunt also shared a handout outlining a scenario of placing content specialists in mathematics and science in IUs, as demonstrated by this MSP.
Also in early January, Secretary Zahorchak asked for informal assistance in considering how the state could **roll-out such support state-wide**, and Dr. Bunt assisted with language and preparation of budget scenarios. Ultimately, the political decision was made to initiate the K-12 math and science approach by rolling out hands-on science at the elementary level as exemplified by ASSET, Inc. a former LSI.

Secretary Zahorchak also participated in the MSP Network Connections event in February, enabling the 500 assembled educators to hear a presentation of the Governor's Budget with its emphasis on support for education. For many of the educators, it was the first opportunity to interact with PDE policy makers.

In mid-winter 2006, the MSP was asked by PDE to look at the **Fordham Report on State Science Standards** and provide an objective review of their recommendations and suggest an appropriate PDE response. With MSP interest in coherent challenging curricula based on standards, the opportunity to provide such input was welcomed.

Dr. Bunt was commissioned by PA Governor Rendell as a member of the **Governor's Commission on "Training America's Teachers"** which was charged with developing recommendations to position Pennsylvania at the forefront of effective teacher preparation. According to the latest draft of the Commission Report, the MSP vision and key approaches have been articulated and will appear in Commission recommendations with expected release in June 2006.

Governor Rendell also appointed another **Governor's Commission on "Challenging Coursework for all Students."** Seeing clear connection to MSP goals, the MSP was pleased to assist PDE Commission staff in recruiting a secondary math teacher nominee for the Commission from an MSP district. Dr. Bunt also assisted with a regional Commission workshop on aligning higher education and K-12 expectations, and became familiar with the "Diploma Project" of Achieve, Inc. of which PA is a partner.

In May 2005, the MSP Science Project Director and other MSP Science Coordinators consulted with PDE special education officials to help them consider how to **adapt the state science standards and assessments for Special Needs students.**

B. Integrating/Aligning MSP work with PDE initiatives
By thoroughly understanding the initiatives coming from PDE, the MSP helps districts respond to and take advantage of these opportunities while furthering their progress toward MSP goals. In many cases, the MSP integrates state tools and reporting formats into MSP work. The MSP often helps districts become comfortable with the PDE initiatives through their application to mathematics and science.

1. PA Student Assessment System in Mathematics and Science (PSSA)

Performances on these state exams are benchmarks of the MSP. As noted, the MSP helped refine the standards, assessments, and anchors in mathematics and in science. As PDE desired roll-out of those standards and anchors, MSP worked with IUs to provide those trainings, enhanced with orientations to the Curriculum Frameworks. The MSP frameworks organize the standards into visual knowledge networks which promote the necessary coherence often lost in traditional charts and lists—and help to avoid the narrowing of curriculum to isolated facts and procedures. All MSP Teacher Leadership Academies include Curriculum Framework modules and consequently, include the state standards and assessment anchors.

2. Data Analysis

When the MSP proposal was drafted in 2002, Pennsylvania districts received data disks with spreadsheets of their state achievement test results. Given the prevalence of small central office staff, several district superintendents were not even able to open the reports, much less make sense of them. For Day One of the first Leadership Action Academy in 2003, MSP staff requested the disks and generated graphs for district teams that disaggregated their district math achievement data by standard area and sub-group. Each year since, PDE has refined the data reporting system to include several web-based tools that enable districts to examine their data from multiple perspectives. Currently, the PDE has several web-based data analysis tools, including the *Grow Network*, and in the fall of 2006, will implement *PVAAS* (Pennsylvania's Value Added Assessment System) state-wide. For 2006, PDE is initiating a unique identifier for each student which will ease longitudinal and cross district data analysis.

MSP staff have carefully secured training in each of these PDE tools, and integrate their use into the data analysis supported for district teams in Day One of the MSP Leadership Action Academy each fall. In Year 4, that support will be expanded to involve Teacher Leaders. Each MSP Teacher Leadership Academy will add a data analysis module in the first school-year follow-up session to enable the Teacher Leaders to guide their grade-level colleagues in PSSA data analysis.

3. School and District Improvement Planning Process

Like Education Departments in all states, PDE has developed tools for School Improvement Planning. Their preferred format is called "Getting Results," which specifies stages of planning involving (a) *Data* (with root cause analysis), (b) *Design,* (c) *Delivery*, and (d) *Evaluation*. The key elements of the *Design* component include (a) Quality Leadership, (b) Quality Teaching, and (c) Artful Use of Infrastructure.

With the clear connection to the MSP goals of data-based decision-making focused on helping all students achieve, the MSP adopted the "Getting Results" framework as the format utilized for action planning for MSP districts. MSP staff supported the district's vertical-slice decision-making team in using the framework through the Leadership Action Academy. As noted above, the districts were first assisted in the data analysis component, adding to their data sources MSP measures like "District Profile of Course Completion" and "District Development Matrix," and the PROM/SE (formerly referred to

as TIMSS) Science results. The *Design* portion conveyed the MSP activities within the relevant categories of quality leadership, quality teaching and artful use of infrastructure.

The PDE is actively building a partnership with IUs to have them support all districts in School Improvement Planning. The MSP provided technical assistance related to the mathematics components of plans to all such districts, within the format of each particular IU partner. The PDE-defined planning process also included a review of proposed plans by IU staff. The MSP requested responsibility for reviewing the math components of plans submitted by all districts, and when enabled by the partner IU, carefully completed the review using the rubric developed by PDE.

4. High School Reform

PDE has initiated a competitive grant program for high school reform, named "Project 720" after the number of days in a four year high school career. Its goals of building success for all students in challenging courses synch perfectly with the MSP goals. This initiative also targets one of the areas of concern raised by the NSF Site Visit. MSP staff joined one partner district's team in a Project 720 workshop, and at the same time, offered the PDE facilitator assistance from a mathematics content specialist.

By experiencing that Project 720 workshop, the MSP Coordinator was able to brief the entire MSP Team on Project 720. He also built relationships with district educators that brought new energy to their MSP participation. This integration of work enabled the MSP to utilize the self-assessment tools developed for Project 720 to add to the MSP discussion about advocacy for success for all students through the Leadership Action Academy. MSP's integration of this project also positions other MSP districts to consider qualifying for support from the Project 720 competitive grant proposal process.

Another PDE initiative, "Classrooms for the Future," offers a competitive grant program that will support high schools with laptops for every child in support of using technology to re-shape teaching and learning at the high school. Thoroughly familiar with this program, MSP staff are able to assist successful districts in mathematics and science.

5. "Bridge" Coursework to Produce Highly Qualified Teachers

In response to NCLB, PDE has conducted negotiations with USDOE for a process of certifying that teachers meet the NCLB requirements as Highly Qualified for their teaching assignments. As part of the process to enable already certified teachers to "bridge" their qualifications to the more explicit NCLB requirements, PDE has defined the nature of qualifying coursework in content areas.

As MSP encourages the development of Content Deepening Seminars, it has been careful to advise developers of the requirements to qualify for "bridge" designation. This piggy-backing on this PDE initiative and Act 48 requirements provides educators with added incentives for participating in activities leading toward MSP goals.

6. Special Education: All trainings related to math or science

Because problems with reading and literacy are prominent within special education, special education practitioners have greater capacity in that area than they do in mathematics. NCLB's emphasis on sub-groups has prompted PDE's Division of Special Education to pay increasing attention to mathematics. To support that focus, through regional training centers called PATTANs, PDE has offered extensive math focused training. To familiarize themselves with the advocated approaches, MSP mathematics specialists have attended all math-related trainings.

The new version of "Instructional Support Teams," as part of the re-authorization of IDEA, is called "Response Through Intervention" by PDE. As PDE pilots this comprehensive approach, involving one MSP district, MSP staff have reached out to be fully informed about this model.

The MSP has encouraged districts to include special education teachers in MSP activities, including the on-site academy trainings. Familiarity with the tools being promulgated by PDE helps MSP staff relate those approaches in the MSP activities, and help districts integrate them into their daily work.

C. PAIUCC: Access to PDE Briefings

For the three years of the MSP, the Principal Investigator has fully participated in the state level meetings of the PA Intermediate Unit Curriculum Coordinators (PAIUCC). This participation has been invaluable in sustainability planning in five ways. (1) PDE briefings offer full understanding of their initiatives as noted above. (2) Interaction in the briefings has built direct relationships with PDE staff to enable the noted consulting/ advisory relationships. (3) Participation in this forum brings mathematics and science expertise to the work of the PAIUCC. For example, through planning organized via the PAIUCC, MSP Science Specialists helped design the PDE roll-out of the Science Anchors. (4) In some cases, via interaction at PAIUCC, distant IU teams have enrolled in MSP activities, generating resource sources for sustainability of MSP approaches. (5) Finally, participation has enabled relationship building with the curriculum directors of the core partner IUs by working side-by-side as they discuss opportunities, challenges and resource constraints. MSP work can also often be accomplished there.

V. Adaptation of Sustainability Strategy to Context of IUs

A. Actively Collaborate in IU Management Policy Initiatives

MSP Coordinators consistently participate in the staff meetings of the Curriculum and Professional Development Departments at three of the partner Intermediate Units. In the lead agency, AIU, the Principal Investigator represents the MSP in Department, Division, and AIU Managers meeting. Through those AIU venues, the MSP is involved in strategic consideration of the IU role. The AIU Executive Director has shared an environmental scan of the current circumstances confronting regional educational agencies. The AIU is proactively distinguishing between "foundation services," i.e. what services are to be provided as a result of its charter and with annual support of its budget, and "fee-for-service," i.e. which services require additional charges. There is a

goal of standardizing how these fees are determined across the AIU. This process is particularly apt as the MSP enters its 4th year, when IUs are to assume 1/3 of the costs.

Each partner IU has its own unique organization and context, requiring tailored approaches to sustainability considerations. The variation became more visible through discussions about MSP replication/expansion plans toward the end of Year 2. One IU in particular seemed to be uncertain about the value of MSP. However, throughout Year 3, that particular IU began to incorporate MSP staff into several IU planning initiatives, and arranged two Content Deepening Seminars at the IU.

As the IU budgeting process for Year 4 approached, the planned assumption of the 1/3 cost by IUs was also approached differently. As intended in the proposal, three of the IUs included the costs in their core budgets, i.e. the budgets which are supported by all districts in the IU. One IU has a very small core budget and routinely sets up other special interest budgets to be supported by particular IU districts. While the majority of those IU districts were MSP partners, the IU Executive Director decided to divide the Year 4 assumption of cost among *only* the MSP partner districts, with amounts varying according to their student enrollment. This prompted several districts to announce that they were withdrawing from the MSP to avoid the charges. The Executive Director responded to this news by increasing the amount of the shares the other MSP districts would then pay. One of the district superintendents in this IU, who serves on the MSP Cabinet, alerted MSP leadership to this approach. Through meetings (1) between MSP leadership and the IU Executive Director, (2) between reluctant superintendents and MSP leadership, and (3) advocacy on the part of the Cabinet Member Superintendent in IU Superintendent Council Meetings, the situation appears to be under control. As more extensive sustainability planning will occur in Year 4, the MSP Cabinet decided to recruit superintendent representation from other core partner IUs. A well-respected AIU superintendent agreed to join the Cabinet in April.

B. Articulate value-added by content-focused assistance in IU support/role

As a preliminary step, the MSP Principal Investigator and K-12 Project Director developed a chart articulating the roles that MSP Coordinators currently play in IUs, and noting a variety of future possible additions. The document also outlines potential revenue sources to support the MSP Coordinator positions. This document is being used for discussion in face-to-face meetings with leadership in the core partners IUs.

C. Integrate MSP Work into on-going work of each Partner IU

As noted above**,** Intermediate Units are increasingly expected to roll-out many of the PDE initiatives. As they so closely match the goals of the MSP, MSP Coordinators willingly help to implement these tools within the core partner IUs, thereby integrating MSP work into the on-going work of the IUs. As noted, these include activities such as (1) roll-outs of PSSA Assessment Anchors in math and in science enhanced with Curriculum Mapping Tools and the MSP Science Curriculum Framework, (2) data analysis initiatives with content area application, (3) School Improvement Planning assistance, and (4) integration of a mathematics focus into Special Education.

PDE also encourages IUs to be providers of assistance to targeted districts in implementing of their school improvement plans. In two of the IUs with such districts, MSP Coordinators provided direct support to district staff beyond the MSP activities.

In addition, MSP work has added value to the following on-going IU initiatives.

- Briefings on research and opportunities concerning mathematics and science are included in the regularly convened role-alike meeting of district Curriculum Coordinators. Longer presentations featured the Science Assessment Anchors in the fall and High School reform data from Project Achieve in the spring.
- New content deepening offerings by IHEs have been added to the repertoire of Continuing Professional Education offered through the IUs.
- For the newly initiated Allegheny County-Wide Professional Development Day (AIU), MSP staff recruited community and IHE presentations in math and science. They also reviewed all proposed math and science related proposals. To encourage MSP districts to take advantage of the time for MSP professional development, as well as offer additional networking with other districts, MSP staff assisted with proposal presentations by teacher leaders, as well as presenting sessions themselves.
- This spring, also in AIU, MSP staff helped to facilitate discussions among the math and science teachers involved in the newly emerging AP Teacher Network.
- In another IU, MSP staff was included in an exploratory IHE partnership discussion.

Areas for future exploration include (1) the possible MSP staff support for math and science related programs in gifted education; (2) integration of *Lenses On Learning* with the IU-led principals leadership training. (3) As IUs review induction programs, MSP will suggest, and possibly provide content-focused additions.

VI. Adaptation of Sustainability Strategy to Unique Context of IHEs

A. Collaborating for Action at IHE Policy Level

The contexts of the four IHEs have varying administrative structures as reflected in the varying compositions of their MSP Leadership Teams. The IHE Team structure serves as both means for communicating with higher administrative levels and for involving the faculty. As particular to their institutions, the IHEs report growing representation on their MSP Teams of faculty from the various departments of biology, chemistry, computer science, education, environmental science, mathematics, physics, as well as from a School of Education and the College of Professional Studies.

New this year, the MSP IHE Team initiated a series of “Deans’ Dinners,” convening the chief academic officers across the four IHEs. Since the inception of the MSP, three of the four IHEs have experienced changes in presidents. Carlow and Robert Morris moved from college to university status. These changes and on-going re-structuring have resulted in multiple administrative changes. The Deans’ Dinners served to familiarize college administration with the MSP agenda. Chatham College hosted the first dinner to begin the conversation about sustainability and life after the grant. The second meeting at Saint Vincent College explicitly raised the issue of appropriately incorporating MSP performance in the eventual process for advancement in rank by

posing a draft statement. The third meeting at Robert Morris University resulted in the unanimous adoption of the following statement by all four IHEs:

The chief academic officers of MSP-SWPA IHEs recognize the expectations of NSF that we promote institutional and organizational change to sustain partnerships' promising practices and policies… to engage and support scientists, mathematicians, engineers, and education faculty to work with K-12 teachers and students… to advance academic achievement in science and mathematics achievement. Thus we affirm that effective (supported by evidence) work by faculty in MSP activities should be included and considered in their applications for advancement and/or tenure.

The "Deans' Dinners" have raised issues of sustainability: what will remain once the MSP is over? What serves the mission of the IHE? What serves the greater good of improving math and science instruction K-16? These lively exchanges have also resulted in closer ties among the four IHEs, both at the administrative and faculty levels.

B. Articulating value-added of MSP to IHE by pursuit of publication

The second Deans' Dinner continued discussion of convening faculty across disciplines and IHEs. There was strong interest in exploring the MSP Evaluation Plan to highlight areas for potential faculty research. RMU leadership expressed urgency to accommodate planning of research agendas. To capitalize on RMU interest, in early April, the Co-Directors of the MSP AET presented to interested faculty from all IHEs.

For Year 3, the MSP Cabinet had authorized the hiring of a full-time MSP Publication and Reports Specialist to help organize the data sources, and coordinate collaboration among AET, MSP staff and IHE faculty. Unfortunately, the first hire only worked with the project for two months. The new Specialist joined the staff in late March, and was introduced at the RMU meeting in early April. Her assistance is welcomed.

In 2005-2006, there were eight presentations made about SW MSP to professional meetings. Five of those were at national conferences. Presenters plan to develop the presented papers into journal articles. Two published articles from RMU are listed in the Journal Publication section.

C. Integrating MSP goals by accelerating cross-discipline IHE partnership

1. Convening of joint meetings of Math and Science Leadership Teams

In previous years, the MSP teams managing the K-12 science and math intervention planning each met separately as the Math Leadership Team or the Science Leadership team four times a year. As planned in response to a SVT recommendation, the teams were convened jointly in the fall. At that meeting it was decided to reduce the number of times that the Mathematics & Science Leadership Teams met to twice each year, and to introduce product-focused "working groups," which are discussed below.

2. **"Expert partner" trainings by Steve Benson and Catherine Lewis**
MSP Coordinators and math and science IHE faculty received two days of professional development training from Steve Benson (EDC) on using data in problem solving. In preparation for the introduction of lesson study, MSP Coordinators were led in a book study of *Building Our Understanding of Lesson Study*. Using information from her *Lesson Study: A Handbook of Teacher-Led Instructional Change*, Catherine Lewis facilitated a one-day session for cross-disciplinary IHE Faculty and the coordinators.

3. Engaging IHE participants in working groups
Working groups were implemented to enable more IHE faculty to participate in planning the content of the teacher leadership academies (TLA). While cross-discipline collaboration was not prevalent due to the focus of the TLAs, there was much cross-IHE work. One challenge of time availability by IHE faculty remains an issue. Faculty are more available in the late afternoon and early evening. For the science faculty, long lab sections preclude most additional day time activities. For the Education faculty, student teacher supervision during the day also makes attending day sessions difficult. Use of MSPNet as a collaborative work space on TLAs is one strategy being employed.

VII. Adaptation of sustainability strategy to context of K-12 Districts

A. Influence policy by assisting districts to respond to PDE & NCLB mandates
In Pennsylvania, where districts have extensive local control, attempting to influence policy development in 48 different districts is challenging. The strategy of influencing policy at the state level has been detailed above. Another lever for moving toward MSP goals is to be the "cooperative partner" who assists districts to respond to the requirements inherent in NCLB, which are conveyed directly to districts by PDE. To that end, MSP has helped districts see the alignment of MSP goals with the NCLB requirements. Documents showing that alignment have been shared and discussed with the district leadership teams through the Leadership Action Academy.

B. Elicit and articulate MSP value-added to on-going work of district
Day 4 of Leadership Action Academies in the Spring of 2006, proved to be successful in two key aspects as evidenced by evaluation comments. (1) As noted, strategies and tools developed in MSP activities were elicited. District educators, in many cases for the first time as evidenced by their comments, were enlightened about what was done in the various academies, recognizing the common elements that existed, and seeing how the activities fit together. (2) District teams then listed the initiatives that their districts were encountering and considered how the MSP tools and strategies supported these initiatives, making explicit the potential integration into their on-going work.

C. Accelerate and expand advocacy for access and success of all students in challenging mathematics and science courses.

1. Engaging the District Leadership via a Superintendent Briefing
The MSP Response to the Site Visit Report outlined plans to engage K-12 top leadership in this effort. In September, superintendents and lead administrators from

partnering districts were convened in an after-school reception for an update of the MSP progress. In response to this first invitation to gather at one central location, at the Carnegie Science Center rather than in their IUs, superintendents from 21 of the 48 MSP districts participated. The session focused on the recent Business Roundtable findings in the report, "Tapping America's Potential," related to the MSP goals.

2. Accelerate advocacy for and implementation of effective strategies to increase sub-group access and achievement

a. **LAA Days One, Two and Three**

At the reception in September, superintendents were asked to send their high school guidance counselors and secondary building principals to Days One, Two and Three of the Leadership Action Academy to join their vertical slice Leadership Team. On Day One, the district team examined the District Profile of Course Completion data, disaggregated PSSA and PROM/SE date, and engaged in root cause analysis of the achievement of their students. On Day Two, at Network Connections, they explored research about providing access to challenging coursework for all students, and discussed their district's Project 720 self assessment. On Day Three, at February Network Connections, the team explored relevant research and the work of Ruby Payne to analyze strategies for improving sub-group achievement.

b. Adding module in TLAs for disaggregation of data

For Year 4, all TLAs are adding a module in the first school year follow-up session to help Teacher Leaders guide their colleagues in disaggregated analysis of achievement data. To this point, data analysis of large scale achievement data has been confined to the LAA. These modules will add leadership capacity to grade level data analysis.

3. Accelerate advocacy for districts' adoption and effective implementation of challenging curricula

a. Teacher Leadership Academies

All of the Teacher Leadership Academies (TLAs) feature challenging curricula as examples of exemplary strategies of instruction. A key focus of the second year of the High School TLA is implementation of pilot materials, which enables teachers to share the experience of exploring research-based instructional materials with their colleagues. As educators experience the benefits of materials that support challenging work for students, they become advocates for making them available to their students. At least three more MSP districts are considering adoption of challenging curricula in mathematics at some level in the district for the 2006-2007 school year.

b. "Considering Challenging Curricula" Seminar

To accelerate that consideration, MSP offered a two-day "Considering Challenging Curricula" Seminar at the Carnegie Science Center in order to assist districts in developing criteria to evaluate standards-based curricula in mathematics. Using materials and formats from EDC, sessions for the 65 participants on three elementary and three secondary curricula were led by teachers currently using those curricula.

c. Expansion of Educator Networks to Implementation Networks

Implementation sessions for *Everyday Mathematics, Investigations in Number, Data, and Space,* and *Connected Mathematics* were initiated to enable districts to use these curricula successfully. This approach involved grade level groups in working through an entire unit, understanding the activities and exploring the math behind them. These networks have been so popular that extra sessions will be added in our Year 4 implementation plan.

d. Quantum Simulations Tutor Subsidy

With support of two local foundations, MSC offered a subsidy for districts to provide subscriptions to an on-line "homework helper" for their chemistry students. A spin-off from Carnegie Mellon University's cognitive science research, this thoroughly researched program models the formative assessment and "advancing" questioning strategies advocated by the MSP. Ten districts became involved in this pilot year.

e. Addition of Three New Teacher Leadership Academies

In response to district requests, and data analysis, MSP staff and IHE faculty are developing three new TLAs to be introduced in the summer of 2006. All will utilize the established three year format. To accommodate expansion districts, MSP is also offering a third cohort of its original three Teacher Leadership Academies. With three new TLA academies, there are six distinct academies, three with three different levels (first, second, third years of participation), repeated at up to three geographic locations, there will be almost 30 TLAs occurring in the summer of 2006.

- The Early Learners Teacher Leadership Academy (ELTLA) addresses the special challenges of laying the foundations of mathematics (2006) and science (2007) in kindergarten through grade 3. *Cognitively Guided Instruction* will be featured.
- The Elementary Science Teacher Leadership Academy (ESTLA) addresses the lack of professional development providers in Beaver Valley IU region. While featuring inquiry, it will develop understanding of the physical sciences. Negotiations are underway to feature West Ed's "Electricity and Magnetism" course for 2007.
- The Middle School Science Teacher Leadership Academy (MSTLA) will adapt the HSTLA inquiry module to middle school in the first year. Negotiations are underway to feature West Ed's content courses in the second and subsequent years.

D. Document, review, and refine strategies to create sustainable in-district learning communities

1. Accelerate documentation of and support for In-District On-Site Academies

The On-Site Academies are the MSP strategy to reach enough teachers to bring the intervention to scale. In addition to the sources noted above, the MSP carefully analyzes the sign-in sheets that document the On-site Academies. Because of the timing of this Annual Report, this discussion is only about 2004-2005 school year.

a. Data-based analysis of implementation via sign-in sheets

Forty-one of the 48 MSP districts conducted a total of 106 on-site academies, counting each separate EMTLA, SMTLA or HSTLA led by Teacher Leaders. The MSP had set an ambitious goal of 24 hours of on-site professional development for each academy. In 2004-2005 14 academies met that goal. 27% of the on-site academies met with at least half their participants for more than 20 hours, 37% for between 10 and 20 hours, and 38% for fewer than 10 hours. The hours varied within districts for various TLAs.

Each TLA promoted 8 modules of about 3 hours for district presentation. Regardless of hours spent, more than half (51%) the academies reported conducting 7-8 of the expected 8 sessions, with 34 academies conducting all 8. Another 30% conducted 4-6 sessions, with the remaining 19% managing 1 to 3 sessions.

b. MSP Coordinator Support Includes Visits to On-Site Academies

In the first year of implementation of on-site academies, MSP staff intentionally refrained from visiting districts to allow teacher leaders to become established as the facilitators of their learning communities. Technical assistance was provided in-person via the five day-long school year TLA follow-up sessions, by phone, by email and via the web-sites. In 2005-2006, while that assistance continued, visits to on-site academies were also scheduled to observe the professional development activities guided by those TLA participants in their second year. These observations provide MSP Staff another source of data from which to make decisions, and will be available for case study perusal.

2. Build support among district administration to provide on-site time

a. Engagement through Leadership Action Academy (LAA)

At LAA Day One, district teams reflected on the districts' progress in developing professional learning communities. A "28th Floor experience" used a metaphor to have each team consider their own community and to project where they saw their district in the evolving process of establishing learning communities. Districts reported various levels in their development; with no district team yet fully implementing strong professional learning communities. Results of evaluations showed that the teams benefited from witnessing how others are working to strengthen the learning communities within their districts.

b. Convene Supt.-only Sessions to discuss concerns/strategies

At the leadership reception in the fall of 2005, district superintendents were given a summary of their districts' concerns, gathered in LAA Day 4, about needed administrative support to effectively work toward the MSP Aims. The superintendents shared suggestions for support strategies. In the spring 2006, eight of the 48 invited superintendents attended the afternoon of LAA Day 4 to view how their district team had matched the MSP tools and strategies with district initiatives. The sustainability document related to MSP Coordinators' present and future roles was also shared. Time was set aside for the superintendents to discuss their concerns with MSP leadership.

c. Support Math Coaches (PDE initiative) via a network to build leadership

The Math Coaches Network continues to offer activities and resources through three half day coaching network sessions. Three major concepts were featured (a) communicating with building staff; (b) engaging staff participation, and (c) analyzing student work. In the last session, coaches are required to reflect on the year's accomplishments and plan for the future using a metaphor to show how they have progressed from last year. The metaphors clearly illustrated how, as new coaches last year, they progressed from working with isolated individuals to working with a small group this year. Their projections show an intent to affect a wider learning community.

d. Continue capacity building with *LOL* Follow-up Network

In 2005-2006, two network meetings were convened to support administrators who had previously completed Lenses on Learning (LOL). In the first session, 22 administrators

who had completed LOL shared how they have applied what they had learned. The extent of use varied, but none of the administrators were fully incorporating the LOL process. Session time was used to delve deeper into the Learning/ Pedagogy section of the Observation Guide. Emphasis on better recognizing the math thinking was incorporated into the activity, an area where administrators expressed need for practice.

3. Build support by providing "scaffolding" of MSP tools to make time productive and cost –effective

a. Analyze concept maps of TLAs to make explicit components' purpose to assist purposeful tailoring of on-site academies by Teacher Leaders

The lens of the observations of the on-site professional development revealed that what the teacher leaders have learned is communicated through the on-site professional development in varying degrees of the way it was intended. More guidance is needed for Teacher Leaders to make unavoidable adaptations "productive" rather than "fatal."

b. Provide an introduction to Lesson Study via Day 4 LAA

The concept of Lesson Study was introduced at Day 4 of the Leadership Action Academy, as the planned content of the third year of TLAs. Concerns about Lesson Study, such as time and number of participants, were raised, but overall, the concept was fully accepted. Participants recognized how the MSP training contributed to readiness for beginning lesson study. The *5 E Model* used in the science academies and the *Thinking Through a Lesson Protocol* used in the math academies were readily seen as beginning steps for the Lesson Study process. Teacher leaders are already focusing on student thinking and sharing student work though a tuning protocol. Team comments recognized that lesson study will offer an on-going structure for refinement of practice by professional learning communities within their districts.

c. Respond creatively and flexibly to context of each district

To enable stronger communication between the coordinator and the district lead administrator, MSP Coordinators were trained in techniques to improve communication. As changes in district administration have been frequent, MSP staff develop individual approaches to engage new administrators. MSP Coordinators develop individual district transition plans for changes in teacher leadership. As Lesson Study is introduced, MSP staff will help Teacher Leaders develop individualized on-site academy plans according to accomplished on-site content.

VIII Emerging Lessons From Practice

1. The "perfect can not be allowed to be the enemy of the good." It is tempting to wish for better teachers. It is crucial to emphasize that, just as all students can learn math and science, all teachers can learn how to better teach math and science, and may require multiple approaches to engagement in refining the shared practice.
2. Educators very slowly build confidence that "less is more," i.e. that much can be learned from an in-depth treatment of a topic. This manifests itself across K-16 culture in the struggle to sustain attention/focus in a lesson, in a unit, on a particular partnership, perhaps driven by a focus on coverage and prevalence of passing fads.
3. In taking interventions to scale, teacher leaders must be supported via explicitness of purpose and transparency in instructional decision-making to enable their inevitable adaptations to be productive rather than fatal to the use of the resources.