IL120101 WIP 4 Aurora University Mathematical Modeling and Problem Solving in STEM

I. MSP Project Information

A. Project

1. Partnership title:
   Answer: WIP 4 Aurora University Mathematical Modeling and Problem Solving in STEM

2. MSP project director:
   Answer: Dr. Saib Othman

3. Project director phone number:
   Answer: 630-844-4229

4. Project director email address:
   Answer: sothman@aurora.edu

5. APR Performance Period:
   Answer: FY 2011 - October 1, 2011 through September 30, 2012

6. Sources of Funding for this MSP project for the 12-month reporting period. (DO NOT include dollar values of in-kind contributions.)
   MSP Grant Funded through Title II, Part B ($):
   Answer: 138,585.00

B. Lead Organization

1. Number of partner organizations/institutions (including the lead organization):
   Answer: 13

2. Name of lead organization/institutions:
   Answer: Aurora University

3. Type of lead organization/institution:
   Answer: Institution of Higher Education (IHE)

C. Partner Organizations
   Answer:

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   Partner 1
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1. Name of participating organization/institution:
   Answer: Aurora University
2. Type of participating organization/institution:
Answer: Institution of Higher Education (IHE)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Saib Othman

Phone number:
Answer: 630-844-4229

Email address:
Answer: sothman@aurora.edu

4. Partner's Roles on MSP Project:
Answer: Lead organization

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Partner 2
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1. Name of participating organization/institution:
Answer: West Chicago Elementary School District 33

2. Type of participating organization/institution:
Answer: Local education agency (LEA)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Dr. Ed Leman

Phone number:
Answer: 630-293-6000

Email address:
Answer: lemane@wego33.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders
Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 3
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1. Name of participating organization/institution:
   Answer: Islamic Foundation School

2. Type of participating organization/institution:
   Answer: Local education agency (LEA)

Other (Please Specify):
   Answer:

3. Main contact person's name:
   Answer: Ghada Fahmy

Phone number:
   Answer: 630-941-8800

Email address:
   Answer: gfahmy@ifsvp.org

4. Partner's Roles on MSP Project:
   Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 4
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1. Name of participating organization/institution:
   Answer: Community Unit School District 300
2. Type of participating organization/institution:
   Answer: Local education agency (LEA)

   Other (Please Specify):
   Answer:

3. Main contact person's name:
   Answer: Michael Bregy

   Phone number:
   Answer: 847-551-8300

   Email address:
   Answer: michael.bregy@d300.org

4. Partner's Roles on MSP Project:
   Answer:

   Design professional development

   Identify and recruit teachers for professional development and/or comparison group

   Participate in/receive professional development

   Provide mentors/coaches/teacher leaders

   Collect and/or provide data

   Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

   Advise project

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Partner 5
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1. Name of participating organization/institution:
   Answer: Elmhurst Community Unit School District 205

2. Type of participating organization/institution:
   Answer: Local education agency (LEA)

   Other (Please Specify):
   Answer:

3. Main contact person's name:
   Answer: David Pruneau

   Phone number:
   Answer: 630-834-4530
Email address:
Answer: dpruneau@elmhurst205.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 6
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1. Name of participating organization/institution:
Answer: Indian Prairie School District 204

2. Type of participating organization/institution:
Answer: Local education agency (LEA)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Dr. Kathryn Birkett

Phone number:
Answer: 630-375-3010

Email address:
Answer: kathryn_birkett@ipsd.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development
Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 7
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1. Name of participating organization/institution:
Answer: West Aurora School District 129

2. Type of participating organization/institution:
Answer: Local education agency (LEA)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Dr. James Rydland

Phone number:
Answer: 630-301-5100

Email address:
Answer: jrydland@sd129.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 8
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1. Name of participating organization/institution:
Answer: East Aurora School District 131

2. Type of participating organization/institution:
Answer: Local education agency (LEA)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Dr. Jerome Roberts

Phone number:
Answer: 630-299-5554

Email address:
Answer: jroberts@d131.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Partner 9

1. Name of participating organization/institution:
Answer: Medinah School District 11

2. Type of participating organization/institution:
Answer: Local education agency (LEA)

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Dr. Joseph F. Bailey

Phone number:
Answer: 630-893-3737
Email address:
Answer: jbailey@medinah11.org

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Identify and recruit teachers for professional development and/or comparison group

Participate in/receive professional development

Provide mentors/coaches/teacher leaders

Collect and/or provide data

Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)

Advise project

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Partner 10
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1. Name of participating organization/institution:
Answer: Waste Management, Inc.

2. Type of participating organization/institution:
Answer: Other

Other (Please Specify):
Answer: Collaborating Partner

3. Main contact person's name:
Answer: William Shubert

Phone number:
Answer: 630-572-8800

Email address:
Answer: wshuber@wm.com

4. Partner's Roles on MSP Project:
Answer:

Design professional development

Provide professional development

Advise project
Partner 11

1. Name of participating organization/institution:
   Answer: Robert Crown Centers for Health Education

2. Type of participating organization/institution:
   Answer: Other
   Other (Please Specify):
   Answer: Collaborating Partner

3. Main contact person's name:
   Answer: Kathleen Burke

   Phone number:
   Answer: 630-325-1900

   Email address:
   Answer: kmburke@robertcrown.org

4. Partner's Roles on MSP Project:
   Answer:
   Design professional development
   Provide professional development
   Advise project

Partner 12

1. Name of participating organization/institution:
   Answer: DuPage Children's Museum

2. Type of participating organization/institution:
   Answer: Other
   Other (Please Specify):
   Answer: Collaborating Partner

3. Main contact person's name:
   Answer: Susan Broad

   Phone number:
   Answer: 630-637-8000

   Email address:
Answer: sbroad@dupagechildrensmuseum.com

4. Partner's Roles on MSP Project:
Answer:

Design professional development
Provide professional development
Advise project

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Partner 13
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1. Name of participating organization/institution:
Answer: Illinois Math and Science Academy

2. Type of participating organization/institution:
Answer: Other

Other (Please Specify):
Answer: Collaborating not for profit organization

3. Main contact person's name:
Answer: Michelle Kolar

Phone number:
Answer: 630 907-5000

Email address:
Answer: mkolar@imsa.edu

4. Partner's Roles on MSP Project:
Answer:

Design professional development
Provide professional development
Advise project

II. MSP Project Abstract

A. Project Abstract

Answer:
Aurora University and its collaborative partners have developed Mathematical Modeling and Problem Solving in STEM for Secondary Mathematics and Teachers, an innovative Summer Institute Program designed as a three-week immersion into the teaching and learning of
mathematics. University faculty will deliver Mathematical Connections coursework, and mathematicians, scientists and engineers among the collaborative will deliver life problems in science, engineering, and technology. Participating high school districts include: Aurora District 131, Aurora School District 129, Plano Community School District 88, Indian Prairie School District 204, Oswego Community Unit School District 308, Community Unit School District 300, Elmhurst Community Unit School District 205, West Chicago Elementary School District 33, Medina School District 11, and Islamic Foundation School.

The Summer Institute aligns with new Illinois Learning Standards Incorporating the Common Core Mathematics. Evaluation strategies are integrated the program and include measures of the quality professional development, change in teacher content knowledge and instructional practices, student achievement and sustained administrative support.

IMSP WIP4 Project Director:
Saib Othman, Aurora University
sothman@aurora.edu

University Partner:
Aurora University College of Arts and Sciences
http://www.aurora.edu/academics/colleges-schools/cas/#axzz1ssqa512U

Business, Industry, Not-for-profit Partner(s):
The Illinois Mathematics and Science Academy (IMSA)
https://www3.imsa.edu/
The DuPage Children's Museum
http://www.dupagechildrensmuseum.org/
Robert Crown Centers for Health Education
http://www.robertcrown.org/
Waste Management, Inc.
http://www.wm.com/index.jsp

III. Responsibilities

A. Administer Overall Program

1. % Provided by K-12 Institutions:
   Answer: 10

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 80

3. Other (Please specify): Collaborating Partners
   Answer: 10

B. Design Professional Development
1. % Provided by K-12 Institutions:
   Answer: 25

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 50

3. Other (Please specify): Collaborating Partners
   Answer: 25

C. Deliver Professional Development

1. % Provided by K-12 Institutions:
   Answer: 0

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 75

3. Other (Please specify): Collaborating Partners
   Answer: 25

D. Evaluate MSP

1. % Provided by K-12 Institutions:
   Answer: 0

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 100

3. Other (Please specify):
   Answer: 0

IV. Professional Development Participants

A. Number of Higher Ed Faculty Involved in MSP Project

1. Number of Mathematics faculty:
   Answer: 1

2. Number of Science faculty:
   Answer: 0

3. Number of Engineering faculty:
   Answer: 1
4. Number of Education faculty:
Answer: 0

5. Number of Technology/Computer Science faculty:
Answer: 1

6. Number of other faculty involved:
Answer: 0
(Please specify discipline): n/a

**B. Indicate the Primary Goal and Target for the Intervention**

1. Please select the main goal of the MSP project:
Answer: Both - Improving individual teacher's content knowledge and training teacher leaders are equally important aspects of our program

2. Please select the primary target of your MSP project: (Indicate the primary target that you are trying to affect by the program.)
Answer: Individual teacher

**C. Total Number of Participating Educators**

1. Total number of teachers and/or administrators receiving MSP professional development in Math or Science: (Do not double-count teachers for this figure).
Answer: 20

**D. Elementary School Teachers**

1. Total number of elementary school teachers:
Answer: 0

A. Regular core content teachers: Elementary school:
Answer: 0

B. Gifted and talented teachers: Elementary school:
Answer: 0

C. Special education teachers: Elementary school:
Answer: 0

D. Teachers of English language learners: Elementary school:
Answer: 0

E. Non-teaching math teacher coaches (full or part time): Elementary school:
Answer: 0

F. Non-teaching science teacher coaches (full or part time): Elementary school:
Answer: 0

G. Paraprofessionals: Elementary school:
Answer: 0

E. Middle School Teachers

1. Total number of middle school teachers:
   Answer: 16

   A. Regular core content teachers: Middle school:
      Answer: 12

   B. Gifted and talented teachers: Middle school:
      Answer: 2

   C. Special education teachers: Middle school:
      Answer: 0

   D. Teachers of English language learners: Middle school:
      Answer: 2

   E. Non-teaching math teacher coaches (full or part time): Middle school:
      Answer: 0

   F. Non-teaching science teacher coaches (full or part time): Middle school:
      Answer: 0

   G. Paraprofessionals: Middle school:
      Answer: 0

F. High School Teachers

1. Total number of high school teachers:
   Answer: 4

   A. Regular core content teachers: High school:
      Answer: 4

   B. AP/IB: High school:
      Answer: 0
C. Special education teachers: High school:  
Answer: 0

D. Teachers of English language learners: High school:  
Answer: 0

E. Non-teaching math teacher coaches: High school:  
Answer: 0

F. Non-teaching science teacher coaches: High school:  
Answer: 0

G. Paraprofessionals: High school:  
Answer: 0

G. Administrators

1. Total number of administrators:  
Answer: 0

A. Administrators: Elementary school:  
Answer: 0

B. Administrators: Middle school:  
Answer: 0

C. Administrators: High school:  
Answer: 0

D. Other (please describe): 0  
Answer:

H. Participant Students

1. Number of elementary school students taught by participating teachers:  
Answer:

2. Number of middle school students in math and/or science classes taught by participating teachers:  
Answer:

3. Number of high school students in math and/or science classes taught by participating teachers:  
Answer:
V. Professional Development Models

A. Contact Hours
   Answer: 80

B. Type of Professional Development Activities
   Answer: Summer Institutes only

   B. i. Summer Institutes

   1. Total duration in HOURS per participant (on average):
      Answer: 80

C. Description of Professional Development Model
   Answer: Professional development was facilitated by three university faculty, two master teachers (graduates from Aurora IMSP Teacher Leadership Program) and scientists and engineers from the collaborative partners.

   The AU WIP 4 Summer Institute in Mathematics is designed as a three-week immersion into the teaching and learning of mathematics, offered for graduate credit to teachers of grades six through twelve. The focus of the workshop will be on mathematical modeling (Core Standard #4) and problem solving (Core Standard #1).

   The university has equipped a classroom with cutting edge technology including a SMARTBoard, classroom response systems ("clickers"), wireless presentation systems, notebook computers, TI-NSpire graphing calculators and software, Vernier sensors and analysis software, Geometer’s Sketchpad, and Maple Mathematics Education software. More information is included in the attached syllabus.

VI. Professional Development Content and Processes

A. Mathematics Content and Processes

1. Did your MSP project provide training in math content or processes in the MSP professional development during this 12-month reporting period?
   Answer: Yes

2. Please indicate the major content or topics of mathematics taught to teachers in the MSP activities during this 12-month period. Select all that apply and indicate the GRADE LEVELS OF TEACHERS to whom each topic was taught.

   2.1 Number and Operations:
B. Science Content and Processes

1. Did your MSP project provide training in science content or processes in the MSP professional development during this 12-month reporting period?
   Answer: No

2. Please indicate the major content or topics of science taught to teachers in the MSP activities during this 12-month period. Select all that apply and indicate the GRADE LEVELS OF TEACHERS to whom each topic was taught

   2.1 Scientific Inquiry:
      Answer:

   2.2 Physical Science/Physics:
      Answer:

   2.3 Chemistry:
      Answer:
2.4 Life Science/Biology:
Answer:

2.5 Earth Science:
Answer:

2.6 Technology:
Answer:

2.7 Other (Please Specify):
Answer:

VII. Program Evaluation

A. Type of Evaluator

Please select from the list below the best description of your project’s evaluator.
Answer: Statewide evaluation
Other (Please specify):

B. Evaluation Design
Answer: One-group design

B. iv. One-Group, Qualitative/Descriptive, and Other Designs
Answer: The state evaluation framework was enacted at the local grant level and includes content tests, surveys, peer observation, student performance products, and site visits by the state evaluation team.

Year One was a pilot / scaling up period with a focus on teacher content knowledge. Teachers will implement in the classroom in Year 2. Baseline instructional practice levels were also collected at the end of Year One.

Content Knowledge:
The DTAMS teacher content test used was for Middle School Teachers - Algebraic Ideas.

Effectiveness of the IMSP and access to STEM tools, partners, and peers:
Teacher participants were surveyed at the end of the first year. The survey was adapted from Adapted from Annual Satisfaction Survey for Community Coalitions. Wolff, T. (2003). A practical approach to evaluating coalitions. In T. Backer (Ed.) Evaluating Community Collaborations. Springer Publishing and covers teachers’ perceptions of the effectiveness of the local MSP vision, leadership, communication, technical assistance, progress and outcomes, and sustainability. Analyses from prior years’ administration for the IMSP indicated that the internal consistency was
strong with $\alpha = .97$ (n=875). In order to compensate for attrition in responses due to the “not applicable” response choice which causes the listwise deletion of cases in analyses and an inflated Cronbach’s alpha, these responses were replaced with the appropriate subscale median. Teachers completed additional surveys.

Instructional Practices:

In Year Two, teachers will implement strategies, tools, and curricula resources with their students. Student pre- and posttests constructed from released items will be triangulated with student survey data and a performance product scored with a common rubric. Teachers will complete peer observations and state evaluators will conduct site visits to a sample of classrooms.

C. Phase of Implementation
   Answer: Stage 1: New (conducting start-up tasks such as formalizing partnerships and implementing the professional development model for the first time)

D. Assessment Measures

Assessment Measure 1

Assessment of Teacher Content Knowledge - Math
   Diagnostic Mathematics Assessments for Middle School Teachers (Bush)

1. Description of the assessment measure/test:
   Answer: Nationally normed and/or standardized test

2. Were the results of this measure used in the reporting of GPRA indicators for teachers or students in section VIII (Government Performance & Results Act Reporting) of this APR?
   Answer: Yes

E. Analysis of Changes in Teacher Practice

1. How are you measuring the extent to which teachers are applying lessons from the MSP PD to their classroom instruction?
   Answer: Questionnaire/Self-report

Other (Please specify):
F. Teacher Findings
Answer: Teacher Findings: DTAMS - Algebraic Ideas
A paired sample t-test showed that there was no significant difference in DTAMS test scores between the pre (N = 20, MeanPre = 58.625, SD = 25.501) and the posttest (MeanPost = 56.875, SD = 18.333) reported by t(N) = 0.4235, p = 0.3383, 95% CI [-2.7596, 4.1596], Cohen's d = 0.0947.

While our overall population of teachers did not see significant improvements on the DTAMS Algebraic Ideas, the descriptive statistics broken down by category did show trends of improvement under the categories of Factual Knowledge and Equations and Inequalities. The main goals of our IMSP were to both improve teacher content knowledge and also improve the communication and awareness of how mathematics teachers incorporate scientific ideas into their curricula. To this point, we recognize the abilities and backgrounds of our teachers were quite diverse, and this is evident by the large standard deviations reported in our testing (Pre: 58.625 ± 25.501, Post: 56.875 ± 18.333). Our standard deviations did decrease by 28%, indicating that individual participants must have improved their scores closer to the mean. This is also illustrated by the fact that 25% of our participants saw an average of a 10 point increase on their posttest. This strongly illustrates that the teachers most deficient in their content made the greatest knowledge gains.

Teacher Findings Surveys

Teachers self-reported their satisfaction with their progress this year in the IMSP WIP4 program, including their satisfaction with their access to STEM technologies, professionals, and opportunities for peer collaboration. Descriptive statistics are available across several items in APR for the section APR Report Knowledge & Practice. Please see attached file with teacher participant comments.

Percentage of teachers reporting satisfied or very satisfied in the following areas:

Teacher Outcomes
Teacher: improvement in teacher content knowledge (75%)
Teacher: use of Common Core mathematical practices (72%)
Teacher: improvement in mathematics instruction (72%)

More specifically, when asked to identify mathematical content areas that the teachers felt the most gain with respect to the content delivered, 68% felt the most gain in linear equations (32%), geometry (23%) and probability and statistics (14%).

STEM Access & Collaboration
Teacher: use of STEM technologies (88%)
Teacher: collaboration with STEM industry experts (84%)
Teacher: access to IMSP peers (66%)

90% of our teachers also commented that they feel more comfortable using the technology introduced during the workshop. Furthermore, 82% agreed that the materials received and available for check out will help them increase their students' motivation to learn.

Teacher comments about individual progress:
1) My mind set of teaching shifted and I want to be able to engage in the activities that I took part
in. I don't have the resources or background knowledge about common core yet but I am excited about what the future holds.

Under curriculum and instruction, teachers reported on their self-reported skill for various formative assessment practices. Our participants felt comfortable with their teaching skills and developing curriculum to support CCSS learning; however, our teachers self-reported that they do not implement daily or weekly formative assessment techniques in their classrooms.

Our teacher cohort also reported on how frequently students engaged in mathematical practices to support the common core standards. Overall, the teachers agreed that all mathematical practices, with the exception of 'Using Tools Strategically,' are addressed daily or weekly. This is an area that we can provide resources both technologically and intellectually to improve the use of these tools in the classroom.

G. Student Findings
Answer: This year was a pilot / scaling up period with a focus on teacher content knowledge. Teachers will implement in the classroom in Year 2.

H. Impact on the Partnership
Answer: Impact on Partnership
Teachers reflected on the vision and support of their local IMSP grant, including the grant vision, planning, and follow-through. Their feedback also included how the grant addressed their needs in general, for collaboration, and building the partnership through mutual trust.

Percentage of teachers reporting satisfied or very satisfied in the following areas:

Grant Support and Vision for IMSP goals
Teacher: Clarity of the IMSP Vision (91%)
Teacher: Planning process for IMSP objectives (83%)
Teacher: Follow-through on IMSP activities (91%)
Teacher: Strength of IMSP leadership (91%)

Opportunities for Collaboration
Teacher: Promoting collaborative action with other educators (84%)
Teacher: Promoting collaborative action with STEM professionals (76%)

Addressing Needs
Teacher: processes to assess teacher needs (69%)
Teacher: processes to assess student needs (69%)
Teacher: resources from district or school (76%)

Developing Mutual Trust
Teacher: Influential people in IMSP have a variety of interests (82%)
Teacher: Diversity of partners and participants (100%)
Teacher: respect for teacher contributions to IMSP goals (83%)
Teacher: opportunities for teacher leadership (66%)
Teacher: trust between partners and participants (83%)
Individual Teacher Comments:
1) I think all math and science teachers at the middle school level should participate in this program.
2) It is a lot of work but I found it fascinating. I wish more middle schools participated in the workshop. I felt like the elementary schools were over represented in the group. That limited the kind of math we could explore.

I. Other Impacts
Answer: Teachers described the sustainability of practices promoted by the IMSP WIP4 program.

Percentage of teachers reporting satisfied or very satisfied in the following areas:

Sustaining Practices
Teacher: integration of common core mathematical practices will be continued (90%)
Teacher: access to common core resources (82%)
Teacher: district will support continued integration of common core mathematical practices (84%)

J. Upload Report
Answer:

VIII. Government Performance & Results Act Reporting

A. Teachers

Total number of teachers receiving MSP professional development in math: (If a teacher receives PD in Math, count that teacher only once.)
Answer: 20

Total number of teachers receiving MSP professional development in science: (If a teacher receives PD in Science, count that teacher only once.)
Answer: 0

Mathematics

1. Number of participants receiving MSP professional development in all math PD courses (If a teacher receives PD in more than one course, count that teacher separately for each course they participate in):
   Answer: 20

2. Number of participants with both pretest and posttest scores in math content knowledge:
   Answer: 20

3. Number of participants who showed significant gains in math content knowledge:
   Answer: 0

Science
4. Number of participants receiving MSP professional development in all science PD courses (If a teacher receives PD in more than one course, count that teacher separately for each course they participate in):
   Answer: 0

5. Number of participants with both pretest and posttest scores in science content knowledge:
   Answer: 0

6. Number of participants who showed significant gains in science content knowledge:
   Answer: 0

B. Students

Mathematics

1. Number of students taught math by MSP teachers:
   Answer: 0

2. Number of students from question 1 with state assessment data in math:
   Answer: 0

3. Number of students from question 2 who scored at basic or below in math:
   Answer: 0

4. Number of students from question 2 who scored at proficient or above in math:
   Answer: 0

Science

5. Number of students taught science by MSP teachers:
   Answer: 0

6. Number of students from question 5 with state assessment data in science:
   Answer: 0

7. Number of students from question 6 who scored at basic or below in science:
   Answer: 0

8. Number of students from question 6 who scored at proficient or above in science:
   Answer: 0

IX. Lessons Learned
A. MSP Implementation

Answer: Aurora University (AU) and its educational and community partners have collaboratively developed and implemented a summer workshop in Mathematical Modeling and Problem Solving in STEM for Secondary Mathematics and Science Teachers, an innovative Summer Institute Program in Mathematics (WIP 4) which meets the goals of the Illinois Mathematics and Science Program (IMSP) for improving the teaching of mathematics and science in high needs school districts.

The AU WIP 4 Summer Institute in Mathematics was designed as a three-week immersion into the teaching and learning of mathematics, offered for 3 graduate credits to teachers of grades six through twelve. The focus of the workshop was on mathematical modeling (Core Standard #4) and problem solving (Core Standard #1). University faculty and the mathematicians, scientists and engineers among the collaborative partners delivered real life problems in science, engineering, and technology. Teachers learned relevant mathematical content and produced a mathematical model to represent each problem. They used different techniques including manipulatives and technology tools to solve a given problem. They shared their solutions, made sense of the results, and discussed how they can present these problems in their own classrooms. Participating teachers can earn up to six graduate credits from Aurora University when they complete the program.

In the AU WIP 4 Summer Institute, theory and practice were woven together in a rich classroom environment for teaching mathematics. From capital expenditures in earlier IMSP grants, the university equipped a classroom with cutting edge technology and resources including a SMARTBoard, classroom response systems (“clickers”), wireless presentation systems, and notebook computers dedicated for in-classroom use. This technology allowed teachers to experience an interactive classroom where they can easily present their ideas and share their own solutions with their peers. The classroom was also equipped with a set of TI-Nspire graphing calculators and software to enable teachers to perform calculations, solve equations and graph mathematical expressions. Other software included Vernier sensors and Logger Pro analysis software, Geometer’s Sketchpad software, and Maple Mathematics Education software. This environment was important to the success of the program because it integrated mathematics content, hands-on use of tools, equipment, and technology, and opportunities for reflection on practice.

The collaborating partners brought specific perspectives on the real world applications of mathematics for participating teachers to explore and discuss. Each partnering institution was responsible for providing a one day, hands-on experience during the three-week summer program which was integrated with the AU coursework and aligned to mathematics standards.

The DuPage Children’s Museum provided a full day of interactive professional development at the Museum Learning Lab. Program elements included:
• Presentation on current mathematics learning research
• Opportunity for teachers to see how the museum staff use learning strategies to encourage students to master mathematical concepts including patterns, grouping, sorting, symmetry, numeracy, and estimation
• GeoSpace©, a DCM Learning Lab that combines geometry and art to demonstrate the relationship of and differences between 2-dimensional shapes and 3-dimensional solids

The Illinois Mathematics and Science Academy faculty and staff have designed a professional development experience that will take participants on a journey of enrichment in mathematics. Participants will explore the nature of inquiry teaching and learning through both individual and
collaborative activities.
The objectives of the IMSA field experience will be:
• To engage teachers in an exploration of mathematical performance assessment
• To provide teachers with strategies for employing mathematical performance assessment in the classroom
• To deepen teacher understanding of selected mathematics concepts and topics
• To utilize an integrated mathematics and science strategy to facilitate several hands-on math activities that are classroom-ready
• To model a process of collaboration, reflection and debriefing

The Robert Crown Centers for Health Education provided a workshop day at their facility in Hinsdale to engage the teachers in a curriculum of applying mathematics to life sciences with engineering applications. The goal was to train the teachers to develop mathematics units involving biological engineering applications as related to life in the future: disease, epidemiology, and genetic engineering. The participants involved linked mathematics to the field of bioengineering through hands-on exploration and group discussion. Goals of the workshop were:

• Gain an understanding of the field of genetic engineering and its associated disciplines
• Learn about the disease mapping in the context of diabetes and how can be related to math lessons.
• Learn about genetic engineering and recombinant DNA technology as it relates to the management of diseases and to genetically modified food supplies: extract DNA from living tissue and learn about the role of DNA in human genetics as well as food-supply technology.
• Participate in a simulation exercise demonstrating the technique of recombinant DNA technology.

Waste Management offered a mathematical modeling and problem-solving curriculum at their Settler’s Hill Landfill in Batavia. The curriculum included the following topics:
• Estimation of waste disposal volume using both the trapezoidal and end-area methods and comparing the results. This involved translating 2-D drawing plans into 3-D cross sections.
• Discussion of the stoichiometry and mass-balance aspects of combustion and emission factors. (Stoichiometry is a calculation of the quantities of reactants and products in a chemical reaction.)
• Introduction to the economics of a gas-to-energy plant. Preparation of an economic model to evaluate capital and operating costs; net present value; and internal rate of return in order to assess economic viability of a project.

One of the challenges in implementing this grant was recruiting a sufficient number of teachers.

B. MSP Evaluation
Answer: This year the evaluation of the grant will be completed using the ISBE portal site. The responsibility of collecting the data has shifted to the partnering school districts rather than an appointed evaluator. This new method of using the ISBE portal for gathering data is very efficient but posses a challenge in which we have to rely on individual teachers to gather student data. Also gathering the data on-line poses a challenge to schools that do not have enough computers available for students to complete surveys and take on-line tests.

Teachers reflected on the benefits of their participation in the IMSP WIP4 program and made recommendations for improving the IMSP. Percentage of teachers reporting satisfied or very satisfied in the following areas:
Benefits of Participating in IMSP
Teacher: important professional benefits from this IMSP (76%)
Teacher: benefits worth the time, effort, and cost (84%)
Teacher: benefits commensurate with contributions (91)
Teacher: this IMSP should be continued (83%)
Teacher: this IMSP needs to be dramatically improved (23%)

Teacher Comments about the local IMSP vision and support and leadership:
1) I almost feel like everyone should go through this. The collaboration was priceless and I wouldn't exchange it for anything.

X. State Review

A. Awards

1. MSP initial award date:
Answer: 01/01/2012

2. MSP length of award:
Answer:

3. Current year of implementation:
Answer:

4. Is this your final report:
Answer:

XI. Attached Supplementary Documents

File 1: Aurora_WIP4_MTH_6020_Syllabus_SU12.pdf
File 2: Aurora_WIP4_Anecdotal_Evidence_of_Impact_SU12.pdf
File 3:
File 4:
File 5: