IL111019 WIP 3 Aurora Physical Science with Engineering Connections

I. MSP Project Information

A. Project

1. Partnership title:
   Answer: WIP 3 Aurora Physical Science with Engineering Connections

2. MSP project director:
   Answer: Dr. Chetna Patel

3. Project director phone number:
   Answer: 630 844-5513

4. Project director email address:
   Answer: cpatel@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: 216379

B. Lead Organization

1. Number of partner organizations/institutions (including the lead organization):
   Answer: 12

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: St. Charles School District 303

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

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: Becky McCabe

Phone number:
Answer: 630 513 3014

Email address:
Answer: becky.mccabe@d303.org

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

Identify and recruit teachers for professional development and/or comparison group
Participate in/receive professional development
Analyze data
Provide teacher support (e.g., substitute teachers, release time, planning time, teacher leaders)
Advise project

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Partner 2
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1. Name of participating organization/institution:
Answer: Robert Crown Center for Health Education

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

Other (Please Specify):
Answer: Collaborating Not for Profit organization

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

Phone number:
Answer: 630 325-1935

Email address:
Answer: kmburke@robertcrown.org

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

Provide professional development

Advise project

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Partner 3
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1. Name of participating organization/institution:
   Answer: Dupage Children's Museum

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

Other (Please Specify):
   Answer: Collaborating Not for Profit organization

3. Main contact person's name:
   Answer: Margaret Hanly

Phone number:
   Answer: 630 637-7000

Email address:
   Answer: mhanly@dupagechildrensmuseum.org

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

   Design professional development

   Provide professional development

   Advise project

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Partner 4
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1. Name of participating organization/institution:
   Answer: Fox Valley Park District

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

Other (Please Specify):
   Answer: Collaborating public entity

3. Main contact person's name:
Partner 5

1. Name of participating organization/institution:
   Answer: East Aurora 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. Marin Gonzalez

Phone number:
   Answer: 630-299-5561

Email address:
   Answer: mgonzalez@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
   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: West Aurora District 129

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

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: LuAnne Kelsey

Phone number:
Answer: 630 301-5085

Email address:
Answer: LKelsey@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
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: Oswego Community Unit School District 308

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

Other (Please Specify):
Answer:
3. Main contact person's name:
  Answer: Dr. Carla Johnson

Phone number:
  Answer: 630 636-3689

Email address:
  Answer: cjohnson@oswego308.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

  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: 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: Dr. Chetna Patel

Phone number:
  Answer: 630-844-5513

Email address:
  Answer: cpatel@aurora.edu

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

  Design professional development
Provide professional development

Advise project

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Partner 9
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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: Allison Sherman

Phone number:  
   Answer: 630 375-3044

Email address:  
   Answer: allison_sherman@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
   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: West Chicago 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: Ed Leman

Phone number:
Answer: 630 293 6000

Email address:
Answer: lemane@wego33.org

4. Partner's Roles on MSP Project:
Answer:
Identify and recruit teachers for professional development and/or comparison group
Participate in/receive professional development
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 11
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1. Name of participating organization/institution:
Answer: Woodstock School District 200

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

Other (Please Specify):
Answer:

3. Main contact person's name:
Answer: George Oslovich

Phone number:
Answer: 815 338 8200

Email address:
Answer: goslovich@d200.mchenry.k12.il.us

4. Partner's Roles on MSP Project:
Answer:
Identify and recruit teachers for professional development and/or comparison group
Participate in/receive professional development

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 12
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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 Community Partner

3. Main contact person's name:
   Answer: Bill Schubert

   Phone number:
   Answer: 630 240 9194

   Email address:
   Answer: wschuber@wm.com

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 (AU) and its educational and community partners have collaboratively developed and implemented an innovative Summer Workshop/Institute Program called Engineering Now for elementary mathematics and science teachers. Participating teachers are from seven school districts including East Aurora District 131; West Aurora District 129; Indian Prairie District 204; West Chicago District 33; Oswego District 308; St. Charles District 303; and
Woodstock District 200.

"Engineering Now" is a two year commitment which started with a 2011 summer workshop in physical science, followed by four in-classroom professional development sessions during the 2011-12 school year. In the summer of 2012, a second workshop in life science was provided, which will be followed by four in-classroom professional development sessions during the 2012-13 school year. Three graduate credits were earned during each summer.

A comprehensive needs assessment was conducted in order to assess the teacher quality and professional development needs of each of the participating school districts as well as their eligibility to participate in the IMSP program. The AU Summer Institute aligns to the goals of the Illinois Mathematics Science Partnership; the Illinois Learning Standards for Science and Mathematics; and the Illinois Professional Teaching Standards.

During the summer of 2012, participating teachers took the course Life Science Foundations. This course introduced topics in the biological sciences with mathematical connections. It enabled participating teachers to increase their proficiency in teaching elementary math and science by deepening their understanding of biological content. Participating teachers studied historical foundations of scientific theory and inquiry. Additional topics included: cell theory, evolution, genetics, growth and development, the fossil record, and the development of complex plant life.

According to the course objectives, participating teachers were expected to:
1. Gain a greater understanding of science as a "way of knowing" and of the scientific method.
2. Appreciate the historical development of scientific thinking in the life sciences.
3. Apply conceptual knowledge to inquiry through lab-based activities.
4. Deepen their appreciation for the concepts of the life sciences evident in our everyday lives.
5. Develop strategies to teach this information, both to their students, and to their peers as teacher leaders.
6. Use action research where appropriate to strengthen teaching for both students and colleagues in the role of teacher leader.

In addition to coursework, the scientists, engineers, and mathematicians among the collaborative partners provided on-site applications of science and mathematics. These workshops had a strong practice base aligned to the curriculum and taught with a hands-on, inquiry based focus. Each day of the workshops included time for discussion of how to apply what has been learned, as well as an opportunity for written reflection.

In addition to Aurora University, this highly collaborative program includes the following partners:
- The DuPage Children’s Museum (DCM) in Naperville transcends the traditional museum experience by integrating art, science and mathematics in original exhibits and programs that encourage children to think deeply and build confidence in their problem-solving skills. Since 1987, the museum’s mission has been to stimulate curiosity, creativity, thinking and problem solving in young children through self-directed, open-ended experiences; integration of the arts, science and math; and the child-adult learning partnership.
- The Robert Crown Center for Health Education is the premier provider of health education to pre-school through high-school aged students, reaching over 140,000 children and their families per year. Their mission is to lead, educate, and motivate youth toward healthy, happy, and safe lives.
- Fox Valley Park District, the largest park district in Illinois outside of Chicago, offers many opportunities for students and teachers at its facilities. Blackberry Farm is a reproduction of a
pioneer village complete with a log cabin, one room schoolhouse, discovery barn, and museum housing an extensive collection of vehicles from the pioneer era.

- Waste Management, Inc. is North America's leading provider of integrated environmental solutions. They partner with customers and communities to manage and reduce waste while recovering valuable resources and creating clean, renewable energy. Waste Management Inc. actively pursues projects and initiatives that benefit the waste industry, the communities they serve, and the environment. For example, Waste Management uses waste to create enough energy to power more than 1 million homes every year. As North America’s largest recycler, Waste Management manages more than 7 million tons of recyclable commodities.

Teachers in the program are required to assess their own performance and that of their students through the evaluation process. The evaluation plan for the program is a descriptive study using a mixed-method approach with qualitative and quantitative components. The evaluation will determine the degree to which the program has improved teaching and learning. The focus of the evaluation is meeting the IMSP project outcomes, which are based on professional development outcomes articulated by the Council of Chief State School Officers. These are quality of professional development; change in teacher content knowledge; change in instructional practices; student achievement; and sustained administrative support.

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): Collaborative not for profit partners
   Answer: 10

B. Design Professional Development

1. % Provided by K-12 Institutions:
   Answer: 30

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 40

3. Other (Please specify): Collaborating not for profit partners
   Answer: 30

C. Deliver Professional Development
1. % Provided by K-12 Institutions:
   Answer: 0

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 65

3. Other (Please specify): Collaborating not for profit partners
   Answer: 35

D. Evaluate MSP

1. % Provided by K-12 Institutions:
   Answer: 20

2. % Provided by IHE faculty (Institutions of Higher Education):
   Answer: 60

3. Other (Please specify): Collaborating not for profit partners
   Answer: 20

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: 2

3. Number of Engineering faculty:
   Answer: 0

4. Number of Education faculty:
   Answer: 1

5. Number of Technology/Computer Science faculty:
   Answer: 0

6. Number of other faculty involved:
   Answer: 0
   (Please specify discipline): (none)

B. Indicate the Primary Goal and Target for the Intervention
1. Please select the main goal of the MSP project:
Answer: Improving teachers content knowledge and teaching methods

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: 25

D. Elementary School Teachers

1. Total number of elementary school teachers:
Answer: 24

A. Regular core content teachers: Elementary school:
Answer: 24

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: 1

   A. Regular core content teachers: Middle school:
      Answer: 1

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

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

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

   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: 0

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

   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: 0

H. Participant Students

1. Number of elementary school students taught by participating teachers:
   Answer: 520

2. Number of middle school students in math and/or science classes taught by participating teachers:
   Answer: 26

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: 136

B. Type of Professional Development Activities
   Answer: Summer Institutes with additional or follow up activities

   B. i. Summer Institutes
1. Total duration in HOURS per participant (on average):
Answer: 120

B. ii. Follow Up

1. Duration on average of HOURS per participant for all follow-up professional development activities.: 16

Answer: On-site professional development during academic year

C. Description of Professional Development Model
Answer: The model for professional development followed by the AU Summer Institute "Engineering Now" is a three-week immersion into the teaching and learning of physical science and life science, offered for graduate credit to elementary teachers of grades three through five in the participating districts. University faculty deliver instruction in content-area curriculum and familiarize the participants with action research. The mathematicians, scientists and engineers among the collaborative partners provide on-site, real world applications of science. The workshop presented in 2011 was followed by four follow-up days in each participants' classroom, reinforcing this learning during the next school year. The workshop has a strong practice base aligned to the science curriculum and taught with a hands-on, inquiry based focus. Each day of the workshop includes time for discussion of how to apply what has been learned, as well as an opportunity for written reflection. The university has equipped a classroom with cutting edge technology and resources to allow the teachers to experience an interactive classroom where they can easily present their ideas and share their own solutions with their peers.

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: No

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:
Answer:

2.2 Algebra:
Answer:

2.3 Geometry:
Answer:
2.4 Measurement:
Answer:

2.5 Probability and Statistics:
Answer:

2.6 Problem Solving:
Answer:

2.7 Reasoning and Proof:
Answer:

2.8 Calculus:
Answer:

2.9 Technology:
Answer:

2.10 Other (Please Specify):
Answer:

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: Yes

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: Elementary School Teachers Middle School Teachers

2.2 Physical Science/Physics:
Answer:

2.3 Chemistry:
Answer:

2.4 Life Science/Biology:
Answer: Elementary School Teachers Middle School Teachers

2.5 Earth Science:
Answer:

2.6 Technology:
Answer: Elementary School Teachers  Middle School Teachers

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: Hired external evaluator - Name of organization & contact information: Tawanda Gipson, M.A. & tawandadgipson@hotmail.com

Other (Please specify):

B. Evaluation Design

Answer: One-group design

B. iv. One-Group, Qualitative/Descriptive, and Other Designs

Answer: Aurora University and its educational and community partners have collaboratively developed an innovative Summer Institute Program in Science, which meets the goals of the Illinois Mathematics and Science Program (IMSP) for improving the teaching of science in high needs school districts. This program, recently completing its second year, was designed as an immersion into the teaching and learning of science, and offered for graduate credit to elementary teachers in the participating districts. University faculty delivered instruction in content-area curriculum and familiarized the participants with action research, problem-based learning (PBL), and inquiry-based learning. The scientists, engineers, and mathematicians among the collaborative partners provided on-site, real world applications of science and mathematics, with an emphasis on strategies to increase teachers' competence in problem-solving.

This report is based on the twenty-five teacher-participants enrolled in the second year of WIP 3 during the 2012 summer workshop. These twenty-five teacher-participants represented seven school districts of elementary and middle school grade levels. Of the twenty-five teacher-participants, four teach first grade, six teach third grade, five teach fourth grade, six teach fifth grade, one teaches seventh grade, two teach kindergarten to fifth grade and one teacher-participant teaches kindergarten. With the conclusion of the summer 2012 workshop program, teacher-participants have completed program requirements and will continue with reflections after follow-up visits from partners during the 2012-2013 school year.

The evaluation design for this program used a mixed-method approach with both qualitative and quantitative components. The mixed-method design involved gathering both numeric information for statistical analysis, as well as text information, so that the final data base represented both the quantitative and qualitative information. The design is considered a single group pre-test post-test design. The program is focused on the five outcome areas as defined by the Illinois State Board of
Education. These outcome areas include: (1) Quality of Professional Development, (2) Change in Teacher Content Knowledge, (3) Change in Instructional Practice, (4) Student Achievement, and (5) Sustained Administrative Support. Data collection sources and data analysis techniques are provided for each of the IMSP project outcomes.

Outcome: Quality of Professional Development

1. Teacher-participants were asked to record their experiences using a Professional Development Activity Log (PDAL). These reflections were recorded using and on-line form that teacher-participants could access through Aurora University. These learning experience reflections provided descriptive data of professional development experienced by the teacher-participants. The reflections focused on the learning process that occurred as well as the outcome. Open-ended responses were aggregated to provide insight into program efficacy. The reflections were recorded during the three weeks of the summer institute with additional reflections to be recorded after the follow up visits by AU educational partners during the 2012-2013 school year.

2. Teacher-participants also evaluated their workshop experiences using a locally developed course survey. The quantitative evaluation results were designed to align with program expectations completed by teacher-participants following the summer workshop.

Outcome: Change in Teacher Content Knowledge

1. Course grades were used as an indicator of gain in content knowledge. Grade results are provided in the Teacher Findings section.

2. The Diagnostic Teacher Assessments in Math and Science (DTAMS), developed by the University of Louisville Center for Research in Mathematics and Science Teacher Development, was administered at the beginning and end of the three week summer workshop program. The results were used to compare teacher-participants' content knowledge in science.

3. Reformed Teaching Observation Protocol (RTOP), another instrument of evaluation, was conducted by the Aurora University professors during the 2011-2012 school year. These classroom observations gathered information on content, lesson design and implementation, lesson content, and classroom culture for indicators of reformed teaching. The teacher-participants will again be observed during the 2012-2013 school year.

4. During the 2012-2013 school year an Action Research Project will be developed by each teacher-participant. This project will be analyzed for indications of program effects on teacher-participants' content knowledge, pedagogical understandings, as well as student achievement.

Outcome: Change in Instructional Practices

1. The teacher-participants took The Survey of Enacted Curriculum (SEC) assessment at the beginning of the first year of the program (2011) and again during the 2012 summer program to provide a baseline for comparison. A third SEC assessment will be administered at the conclusion of WIP 3 in 2013. Data gathered will provide insight into how and to what extent participants in aggregate groups are using what they have learned in the program. SEC data will also give indications of teacher-participants' curriculum alignment with state goals targeted by the program.

2. The teacher-participants will continue to work on their Action Research Project during the 2012-2013 school year and will be presenting their project to Aurora University during the third and final year of the program. This project will be analyzed for changes in instructional practices.
3. The RTOP as previously described will assess instructional practices and effects on student achievement.

Outcome: Student Achievement

1. The quantitative comparisons of the Illinois Standards Achievement Test (ISAT) mathematics scores were compared for indication of program success on students' achievement. Scores of previous students (2011 school year) of the teacher-participants will be compared.

Outcome: Sustained Administrative Support

1. The program team leaders and other educational and community partners met regularly in team meetings and will continue to meet to ensure the program is progressing and following the design of the program. The team leaders will continue to provide support and feedback through observations and interviews conducted during the 2012-2013 school year.

C. Phase of Implementation

Answer: Stage 2: Developing (revising, enhancing, or further developing professional development model)

D. Assessment Measures

Assessment Measure 1

Assessment of Teacher Content Knowledge - Science
Diagnostic Teacher Assessments in Mathematics and Science (DTAMS)

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

Assessment Measure 2

Assessment of Teacher Content Knowledge - Science
Other (Please specify): Course grades

1. Description of the assessment measure/test:
Answer: Locally developed test with evidence of validity and reliability

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: No
Assessment Measure 3

Other Teacher Evaluation Instrument
Reformed Teaching Observation Protocol (RTOP)

1. Description of the assessment measure/test:
   Answer: Self-report survey/rating by teachers, students, or other MSP participants

Assessment Measure 4

Other Teacher Evaluation Instrument
Surveys of Enacted Curriculum

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

Assessment Measure 5

Other Teacher Evaluation Instrument
Other (Please specify): PDAL

1. Description of the assessment measure/test:
   Answer: Self-report survey/rating by teachers, students, or other MSP participants

Assessment Measure 6

Other Teacher Evaluation Instrument
Other (Please specify): Course evaluation surveys

1. Description of the assessment measure/test:
   Answer: Self-report survey/rating by teachers, students, or other MSP participants

Assessment Measure 7

Assessment of Student Achievement - Math
   State student assessment-mathematics
   Other (Please specify): ISAT

1. Description of the assessment measure/test:
   Answer: Nationally normed and/or standardized test
Assessment Measure 8

Assessment of Student Achievement - Science
State student assessment-science

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

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: Classroom observation  Questionnaire/Self-report  Journals

Other (Please specify): Answer: SEC, RTOPS, and action research project

F. Teacher Findings

Answer: Outcome: Quality of Professional Development

1. Teacher-participants evaluated their workshop experiences using a locally developed survey. Evaluation results were designed to align with program expectations completed by teacher-participants following the summer workshop. Aggregated results for course design: 26% rated as high and 74% as very high. For course content: 1% rated as low, 3% rated average, 42% rated as high and 54% as very high. For instructional materials: 7% rated average, 31% rated as high and 62% as very high.

2. A second measurement was the learning experience reflections that provided qualitative data of professional development. The reflections focused on the learning process and outcome. Open-ended responses were aggregated to provide insight into program efficacy. The reflections were recorded during the summer workshop with additional reflections to be recorded after the follow up visits by AU educational partners during the 2012-2013 school year.

Outcome: Change in Teacher Content Knowledge

1. Grades analysis as presented by Aurora University’s grading website shows that the mean GPA for the summer workshop is 4.0 on a 4.00 scale. Twenty-five participants had a cumulative GPA of 4.00 for the 2012 summer program.

2. The Diagnostic Teacher Assessments in Mathematics and Science (DTAMS) were used to assess teacher-participants in knowledge in science. Teacher-participants were tested at the beginning of the workshop using version 4.2 Life Science as the pre-test and version 6.2 Life Science as the post-test (N=25). Twenty-one teacher-participant scores showed an increase from pre-test to post-test, two scores remained the same, and two teacher-participant scores decreased from pre-test to post-test. The overall increase from pre-test scores (M = 17.16, SD = 4.5) to post-test scores (M = 20.88, SD = 4.4) was statistically significant (t(24) = 5.5, p < .001). This demonstrates the gain in teacher-participant content knowledge over the course of the three week workshop.

3. The Reformed Teaching Observation Protocol (RTOP) was conducted by the Aurora University
professors during the 2011-2012 school year. This instrument gathered information on lesson content, lesson design and implementation, and classroom culture for indicators of reformed teaching. The teacher-participants will again be observed during the 2012-2013 school year. A typical observation was one class period. Eighteen teacher-participants were observed. Two of the observations were excluded due to missing data. The final sample size was sixteen, (N=16). Scores ranged from 0 (never occurred) to 4 (very descriptive). Out of a possible 20 points for Lesson Design and Implementation, seven teacher-participants scored at least 19 points, and six scored 15-17 points. The specific categories of Lesson Design and Implementation and their mean scores include: instructional strategies and activities respected students’ prior knowledge and the preconceptions inherent therein (mean=3.8); lesson was designed to engage students as members of a learning community (mean=3.6); student exploration preceded formal presentation (mean=2.9); encouraged students to seek and value alternative modes of investigation/problem solving (mean=3.2); and focus/direction of the lesson often determined by student ideas (mean=2.9). Results indicate that teacher-participants are integrating their learning experiences into their classrooms. Further categories include Content (propositional knowledge and procedural knowledge) and Classroom Culture (Communicative Interactions and Student/Teacher Relationships). With 40 possible points in Content, eleven scored at least 35 points, four scored 30-34, and one scored 25-29 points. With 20 possible points in Classroom Culture, eight scored at least 18-20 points, and five scored 15-17 points in Communicative Interactions. Thirteen scored between 18-20 and two between 15-17 in Student/Teacher relationships. This summative data clearly demonstrates that WIP 3 is accomplishing its stated goals and objectives.

4. During the 2012-2013 school year an Action Research Project will be developed by each teacher-participant.

Outcome: Change In Instructional Practices

1. The Survey of Enacted Curriculum (SEC) assessment was administered at the beginning of the first year of the program (2011) and again during the 2012 summer program. A third SEC will be administered at the conclusion of WIP 3 in 2013. Data gathered provides insight into how and to what extent participants are using what they have learned in the program, note changes in teaching practices from year to year, and give indications of teacher-participants’ curriculum alignment with state goals targeted by the program. The category of Instructional Practices include procedures, communicating understanding, analyzing information, making connections and active learning. Teacher-participants reported no change in the amount of time spent in procedures (12% in both 2012 and 2011). The amount of time spent in active learning increased from 10% (2011) to 15% (2012). There was only a slight increase in communicating understanding from 11% (2011) to 12% (2012). Finally, the amount of time spent remained at 4% from 2011 to 2012 in both analyzing information and making connections. In the area Cognitive Engagement, (sub categories include memorization, conducting investigations, communicating understanding, analyzing information, and applying and making connections), teacher-participants reported that they are spending less time in memorization with 30% in 2011 compared to 22% in 2012. They are spending more time conducting investigations with 18% (2011) compared to 25% (2012). There was only a slight increase in time spent communicating understanding with 20% in 2011 and 21% in 2012. The amount of time spent analyzing information remained the same (16%) for both 2011 and 2012. Finally, there was a slight decrease in the amount of time spent making connections with 17% in 2011 compared to 16% in 2012. Overall, there were three areas in which there were changes of 5% or more, indicating the program’s major impact on teacher instructional practices. Teachers spent more time conducting investigations and helping their students learn actively, with less time spent on rote memorization. This indicates a higher-level learning environment from the previous year.
2. Teacher-participants continued to record reflections about their experiences. They logged entries with detailed teaching lessons implemented in the classroom and changes in instructional practices. Individual open-ended responses were positive about experiences in WIP 3, lessons, experiences and strategies learned, as well as increased content knowledge in science and understanding and confidence in problem-based learning (PBL).

3. The teacher-participants will continue to work on their Action Research Project during the 2012-2013 school year and will be presenting their project to Aurora University during the third and final year of the program. This project will be analyzed for changes in instructional practices.

4. The RTOP as previously described will assess instructional practices and effects on student achievement.

G. Student Findings

Answer: Measurements used to evaluate impact on student achievement include data from the Illinois Standards Achievement Test (ISAT). This report is based on ISAT scores from spring 2012 following the first year of the summer workshop.

Scores are categorized as follows from the ISAT Performance Level Descriptions according to Illinois State Board of Education ISBE:

Exceeds Standards: Student work demonstrates advanced knowledge and skills in the subject. Students creatively apply knowledge and skills to solve problems and evaluate the results.

Meets Standards: Student work demonstrates proficient knowledge and skills in the subject. Students effectively apply knowledge and skills to solve problems.

Below Standards: Student work demonstrates basic knowledge and skills in the subject. However because of gaps in learning, students apply knowledge and skills in limited ways.

Academic Warning: Student work demonstrates limited knowledge and skills in the subject. Because of major gaps in learning, students apply knowledge and skills ineffectively.

ISAT results for WIP 3 program in elementary mathematics for 2012 report that 85% of third graders (n=135) of teacher-participants met or exceeded state expectations, 82% of fourth graders (n=159), 84% of fifth graders (n=135), and 81% of seventh graders (n=21) met or exceeded state expectations. A total of 450 students of teacher-participants (n=541) met or exceeded state expectations. In grades 4, 5 and 7, the mean scores in the mathematics ISAT showed an increase from 2011-2012. Note: scores for grade 3 do not include comparisons because students were in grade 2 the previous year and therefore did not take the ISAT test.

Specifically, student ISAT math scores for grade 4 increased significantly from 2011 (M = 205.8, SD = 29.8) to 2012 (M = 223.3, SD = 27.4, t(181) = 17, p < .001). The students' math ISAT scores for grade 5 also significantly increased from 2011 (M = 232.1, SD = 31.2) to 2012 (M = 247.4, SD = 32.5, t(152) = 12.7, p < .001). Finally, the students' math ISAT scores for grade 7 significantly increased from 2011 (M = 237.1, SD = 21.0) to 2012 (M = 251.3, SD = 24.5, t(23) = 5.2, p < .001). Again, there is no mean score comparison for grade 3 due to students not taking the ISAT in grade 2.
School districts participating in the summer workshops have a high percentage of at-risk students and are considered high needs schools. It is encouraging that the mean score increased in all grades given the fact that the population of students contains at-risk students.

H. Impact on the Partnership

Answer: Aurora University (AU) and its educational and community partners responded to questions regarding the collaboration which resulted in the development of IMSP workshops. In addition to the university, partners include Robert Crown Center for Health Education, the DuPage Children's Museum, Waste Management, and the Fox Valley Park District.

All partners worked well together throughout the development of the WIP 3 Engineering Now program. When surveyed for their perceptions about their collaborative efforts, all responses were positive.

Partners were asked to comment about the overall quality of the collaboration among partners. They responded that their collaboration was strong due to an openness of communication of topics, which allowed them to build on each others parts to develop effective workshops. They reported that the most effective components of their collaborations were the quarterly lunch meetings, frequent e-mail communication, and AU's staff assisting greatly with the administrative portion (which allowed the remaining partners to focus more on the quality and effectiveness of the professional development workshops). The quarterly lunch meetings were said to provide opportunities for partners to brainstorm ideas together, which allowed for a better quality program.

Partners reported that they were grateful to AU for sharing information such as teacher participant names, grades, and subjects taught so that they could more accurately cater their topics to the appropriate audiences. Also, AU's assistance with planning the logistics was another administrative function the other partners found helpful. Finally, partners appreciated the reflections of the teacher-participants being shared with them because it helps them to plan better for the upcoming 2012-2013 workshops.

When partners were asked about suggestions for improvement of the collaboration process and workshops, they felt that the sharing of the class topics by Aurora University could have been done sooner. They explained that since spring is their busiest time, perhaps receiving the information in January or February may be more helpful. It was also suggested that more specific partner activities be shared so that class projects are not duplicated. This also helps in the preparation for presentation of topics in that they are aware of what the participants have already been introduced to and too much time is not spent on that topic. They also suggested that it would have been more helpful to identify teacher-participant expectations more clearly. Some partners perceived that participants intend to use the information as an enhancement of their current knowledge as opposed to an incentive to drastically change their methods of teaching science. In addition, some partners felt that the teachers should be encouraged to become more familiar with the modern technology tools as using them will improve the way science is taught in the classroom. One of the challenges suggested is that since teachers come with a variety of backgrounds and comfort levels in technology, it is difficult to make changes in this area. Another challenge given is the difficulty in covering so many topics along with field experiences within a brief three-week time frame.

Overall, partners felt that the teachers responded well to the classroom lectures and tours. The
combination of coaching by AU staff and the implementation of the workshops seemed effective to the partners.

I. Other Impacts
Answer: No other impacts reported.

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: 0

Total number of teachers receiving MSP professional development in science: (If a teacher receives PD in Science, count that teacher only once.)
Answer: 25

Mathematics
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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: 0

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

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

Science
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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: 25

5. Number of participants with both pretest and posttest scores in science content knowledge:
Answer: 25

6. Number of participants who showed significant gains in science content knowledge:
Answer: 18
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: 546

6. Number of students from question 5 with state assessment data in science:
   Answer: 221

7. Number of students from question 6 who scored at basic or below in science:
   Answer: 86

8. Number of students from question 6 who scored at proficient or above in science:
   Answer: 135

IX. Lessons Learned

A. MSP Implementation

Answer: Aurora University (AU) and its educational and community partners have collaboratively developed and implemented a successful innovative Summer Institute Program in Physical Science with engineering connections ("Engineering Now") for elementary teachers, which meets the goals of the Illinois Mathematics and Science Program (IMSP) for improving the teaching of science and mathematics in high needs school districts.

"Engineering Now" is designed as a three-week immersion experience, offered for graduate credit to teachers in the seven participating school districts. Four follow-up days in each teachers' classroom are presented by community partners during the school year. University faculty deliver instruction in content-area curriculum and familiarize the participants with action research. Scientists, engineers, and mathematicians among the collaborative partners provide on-site,
engineering-based applications of science and mathematics. The workshop and follow-up days have a strong practice base aligned to the curriculum and taught with a hands-on, inquiry based focus.

The AU graduate course NSM 5300 Life Science Foundations, was presented, with material integrated with field experiences presented by the collaborating partners. A pre-workshop introduction day in May 2012 included an Action Research Presentation by Dr. Alice Rusevic, information on the upcoming workshop, and the administration of the DTAMS and SEC tests.

In addition to the Aurora University coursework, this highly collaborative program included the following on-site workshops presented by the partners:

The Robert Crown Center for Health Education offered a workshop on the Engineering of Life, covering materials on disease, epidemiology, food science, and genetic engineering. The workshop was held at the Center's Hinsdale Campus. One of the participating teachers described the value of the workshop as follows: "The most valuable part of today's session were the hands on activities. They were things that were easy to plan/prepare, used everyday items, and most of all were activities that not only reinforced the lessons but were certainly doable in the classroom. I will use the information and the activities in my classroom. I plan on having my students create a "pipe-cleaner DNA strand." I do not see how my students academic achievement could not improve with these activities!"

The DuPage Children’s Museum provided two workshops, Energy in our World and Farming for Fuels. A participating teacher pointed out that "there were several activities that I can use in my classroom, but the one that sticks out is the Water Wheel because we teach a lesson on lever and pulleys. It is my hope that teaching with hands-on activities will help motivate the students with learning, which in turn should increase their achievement." The museum also provided classroom hands-on science materials; take-home materials for parents; and an opportunity to work collaboratively with teacher peers to develop science strategies and materials for future classroom use.

The Fox Valley Park District provided a workshop on water quality and the analysis of aquatic systems. A participant summed up her successful experience as follows: "Looking at the samples from the pond water collected yesterday under the microscope was very interesting. I can't wait to do this with my class! There are a few large ponds close to my school where we can get water samples from. I know my students will be so excited to look at microscopic life! We also cover ecosystems in 4th grade and making the terrariums will give my students a better understanding of all the components needed to have a ecosystem work successfully."

A new collaborating partner in the program, Waste Management Inc., hosted a workshop on Renewable Energy at the Prairie View Landfill in Wilmington, Illinois. "I really appreciated the explanation of how landfills are being used to generate and harness methane and how the methane is used to create electricity," stated one participant. "I will use this in my classroom- and am looking forward to tying it into the new science series."

Participating teachers were also enthusiastic about the coursework on genetics and forensic science and engineering, presented by university faculty and two graduates of AU's MATL teacher leadership program. One teacher stated: "Learning about forensic science, DNA, blood types, and fingerprinting gave me a good background so that I can feel more knowledgeable and confident when discussing this with my own students. Although fingerprinting is not part of our science
curriculum, the activities we did with the balloon and putty can easily be done in the classroom with good results. I think students would be able to see the differences in fingerprints once the balloon is blown up and enjoy it as well. Students would be increasing their own background knowledge and have a better understanding of how each person differs from someone else not only with their physical appearance, but with characteristics that are not easily seen with the naked eye."

Each day of the workshop included time for discussion of how to apply what has been learned, as well as an opportunity for written reflection.

The AU WIP 3 Summer Institute successfully brings additional content area and instructional expertise into high needs schools. It allows the university an opportunity to expand its mission and reach out to additional teachers, as well as offer opportunities for educational research by AU faculty and graduate students. The mathematicians, scientists, and engineers affiliated with the program’s community partners have been pleased to have the opportunity to fulfill their educational and community service missions while providing unique expertise and resources to the ongoing Summer Institute program.

The success of the program may be summarized in the words of one participant: "When students are actively involved in their own learning, they get more out of the experience. Keeping students engaged for longer periods can be challenging, and using hands-on activities is conducive to holding their interest for a longer time. With all the ideas and activities we've done these past 3 weeks, I am excited to begin trying them out this fall to help my students make solid academic gains."

B. MSP Evaluation

Answer: The major successes for this phase of implementation for WIP 3 are noted through teacher-participant reflections, ongoing data, and evaluator’s observations of educational and community partners’ discussions and communication.

First, the success of the partnership (and program at this phase) was largely due to the partners’ collaboration of vision, ideas and contributions to the program. Each partner was committed as a team member to the goals and outcomes of the program. Meetings were regularly held with program team leaders and other educational and community partners available to support the ongoing program. The team leaders continue to provide updates to the team as information is made available. Other successes for year two of implementation include the variety of data that was collected and that will continue to be collected in year 3 to provide evidence for proper evaluation of the program and successful outcomes. Both quantitative and qualitative elements continue to provide a great amount of information for evaluation purposes.

Participating teachers successfully learned technology to take advantage of AU’s moodle site, allowing them to post their surveys and reflections online. Moodle is a Course Management System, a web application that educators can use to create effective online learning sites. Through this site, surveys and daily reflections were posted as a component of the program. Responses of the teacher-participants through their reflections provided numerous indications of enthusiasm and accomplishment. When asked what is most valuable about the daily class, one participant states, “It's a tie between the material presented along with the hands-on activities. The things presented such as bio-engineering gave me so many great ideas on how to bring it in to the classroom. From something as easy as having my kids think of a food/animal/insect in the room or home, and how could they genetically change it so that it is more beneficial to the world.” Another teacher states, “The most valuable to me in today's session was the combination of hands-on activities with
lecture. It helps to tie the two together so that the applications and concrete examples go with the knowledge and theory.” “The most valuable to me today was simply ‘learning’ new material. The instruction today was done in such a way that I actually learned something,” another participant reports.

In addition to positive comments about course content and activities, some teachers also felt that learning about free resources was invaluable. One teacher responds to the question of what was most valuable by stating, “The different websites and places to find resources for my classroom. It was wonderful to learn about free resources and a new grading system!

... I already ordered the free posters from the natural resources of Illinois website and set up for iPad activities.”

For most teachers, learning new strategies was a great incentive for program participation. One teacher states, “The most valuable thing from today was learning about the different ways to explain the functions of cell parts in a way to make it easier for fourth graders to understand. In teaching cell parts, using the information from today’s session, I will better be able explain the function of the cell parts as well as the interdependence of the parts within a cell.” Another reports, “I enjoyed going outside and looking for signs of life and how life is affected... My class takes a nature walk and I can use this activity along with my nature walk. I think the kids will love to spy signs of life and observe nature. They will be able to relate what they see to their own lives.”

On another day, a participant states, “Most valuable was the project with photosensitive paper, simply because I was able to see how it can easily be used in the classroom, and how it can be used to teach more about radiography, or about photography. This is another easy activity that will spark my students' interest. Paired with the light box and radio-graphs, they will feel like real doctors and scientists. I plan on using these activities during a unit on the human body.”

In summary, teacher participants reported learning a lot during the three week period and making plans to take their new knowledge and strategies back into their classrooms. The DTAMS results and participant course grades indicate that knowledge in engineering was gained.

The main challenge when evaluating the program was the change in the number of teacher-participants from year 1 to year 2. This was challenging given the change in student ISAT data, which alter the numbers a bit from year to year. For instance, it was essential to understand not to include ISAT student scores for 2011 for teacher participants just joining the program in 2012. In addition, if teacher participants are to be compared in the future across all three years, these changes must also be noted. Another challenge was obtaining the ISAT data from the school districts. Difficulties included: incomplete data, lack of timely response, and miscommunications. Despite this, a large amount of data was obtained. As an evaluator, one must be persistent and flexible in order to facilitate a smooth evaluation process.

X. State Review

A. Awards

1. MSP initial award date: Answer: 10/01/2011

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:
File 2:
File 3:
File 4:
File 5: