

Stimulating Inquiry in Math and Science: Developing a Math Science Community
Annual Report, July 2007

Dr. John Messick and Dr. Glenn Coltharp, Project Directors

1) Cover page with the name of the project, project director, co-director, contact information, statutory partners, and date. (See cover sheet)

2) Abstract / Summary. Include the number of Higher Education faculty that worked on your grant.

The Stimulating Inquiry in Math and Science (SIMS) professional development project is a collaborative project among Missouri Southern State University, the Southwest Center for Educational Excellence, the Ozark Rural Systemic Initiative (ORSI), and the George Washington Carver National Monument.

Twenty-seven teachers are enrolled in the SIMS project or under SIMS and ORSI. The teachers involved in the project teach grades 4-8 in rural schools in Southwest Missouri. Teachers involved in the project are from the following school districts: Carl Junction, Carthage, Exeter, Golden City, Humansville, Lamar, McDonald County, Mt. Vernon, Seneca, Southwest R-5, and Webb City. The Professional Development project team includes the principal investigators for the SIMS project: Dr. John Messick, Dean of the School of Arts and Sciences, and Dr. Glenn Coltharp, Dean of the School of Education. The professional development is led by a variety of faculty from Missouri Southern State University and collaborators from the Southwest Center for Educational Excellence. The MSSU faculty includes: Dr. Laura Adkins, professor of mathematics; Dr. John Knapp, professor of physical sciences; Dr. Dan Marsh, professor of physical sciences; Dr. Dan Overdeer, professor of teacher education; and Dr. Deborah Pulliam, professor of teacher education.

Workshops in mathematics or science were offered in the summer and fall of 2006. Participants chose from workshops that focused on particular content at specific grade levels. Both the mathematics and science workshops provided professional development for a range of topics. For example, the mathematics workshops include opportunities to investigate the use of math games and examine content strands in the *Everyday Math*, *Connected Mathematics*, or *Math Thematics* curricula. The science workshops included training with science kits, such as Living Systems, Understanding Principles of Energy, and Understanding Topics in Earth Systems. A technology session was also included on the use of Inspiration™ software. During these workshops, teachers heard lectures, had discussions, and engaged in activities as students would.

E-conferencing (synchronous communication software) sessions began in November and offered monthly mathematics or science professional development. These sessions were designed to discuss professional readings, share classroom implementation issues and concerns, and support inquiry-based pedagogy. Dr. Laura VanGilder, a former principal, was added to the SIMS project during the 2006-2007 school year as an Instructional Coach. Dr. VanGilder

provided classroom-based support by visiting the classrooms of participating teachers. These visits involve observation and informal feedback and support. An initial visit was completed to project teachers' classrooms in the fall with follow-up visits in the spring.

3) Table of contents with page numbers. (See Table of contents)

4) List of school districts and the number of participants from each (highlight high-need school districts). Include the average number of contact hours per participant and the time period over which the contact hours took place.

District	Number of Participants	Average Number of Contact Hours	Time Period for Contact Hours
Carl Junction #	3	59.33	5/24/06 – 3/21/07
Carthage #	4	60.00	5/24/06 – 3/21/07
Cassville @	6	66.00	5/24/06 – 3/21/07
Exeter #	3	42.50	5/24/06 – 3/21/07
Golden City #	2	57.50	5/24/06 – 3/21/07
Humansville @	3	52.00	5/24/06 – 3/21/07
Lamar #	5	57.20	5/24/06 – 3/21/07
Marionville #	1	60.00	5/24/06 – 3/21/07
McDonald County @	2	66.00	5/24/06 – 3/21/07
Mt. Vernon #	1	34.00	5/24/06 – 3/21/07
Seneca #	3	38.00	5/24/06 – 3/21/07
Southwest #	3	43.00	5/24/06 – 3/21/07
Webb City #	1	60.00	5/24/06 – 3/21/07

= SIMS participants (N=26)

@ = ORSI participants (N=11)

* 37 participants attended a total of 1,882 hours of workshop instruction, resulting in an overall average of 50.87 hours per participant.

* Participants attended in a total of 1,882 hours of workshop instruction; this represents 85% of the total hours offered (37 X 60 = 2220)

* Participants completed the contract hours in a period of 302 days

5) Description of project activities completed by participants

JUNE:

Title: **Math Games & How They Help With the GLEs (SIMS)**

Date: June 10, 2005

Time: 8:30 -4:15 p.m.

Location: Southwest Center

Audience: K-6 Math Educators

Facilitators: Sue Cavness & Laura Morris

Description: Teachers using *Everyday Math and Growing with Math* will benefit from knowing the skills and benefits of each game for their students.

Title: **Everyday Math: Intermediate Grading (SIMS)**

Date: June 17, 2005

Time: 8:30 – 11:30 a.m.

Location: Southwest Center

Audience: Grades 4-6 Math Educators

Facilitator: Laura Morris

Description: Different ways to assess a student's progress will be explained.

Title: **Everyday Math: Intermediate Grades Management (SIMS)**

Date: June 17, 2005

Time: 12:30 – 3:30 p.m.

Location: Southwest Center

Audience: Grades 4-6 Math Educators

Facilitator: Laura Morris

Description: Ways to use the program efficiently will be presented.

JULY

Title: **Everyday Math: Teacher's Assessment Assistant CD (SIMS)**

Date: July 6, 2005

Time: 8:30 -11:30 a.m.

Location: Southwest Center

Audience: Grades K-6 Math Educators

Facilitator: Jeni Hearting

Description: Teachers will work in the computer to learn how to make reviews and assessments. This is a time-saver for all teachers using *Everyday Math*.

Title: **Everyday Math Graphing Strand (SIMS)**

Date: July 6, 2005

Time: 12:30 – 3:30 p.m.

Location: Southwest Center

Audience: Grades K-6 Math Educators

Facilitator: Jeni Hearting

Description: Middle School math teachers need students who are proficient in graphing concepts – reading and developing them. You will see the connections between the grade levels.

Title: Graphing Calculators (SIMS)

Date: July 7, 2005

Time: 9:30 a.m. – 3:30 p.m.

Location: MSSU, Taylor Hall, Room 218

Audience: Grades 4-8 Educators

Facilitator: Dr. Laura Adkins, Professor of Mathematics

Description: Teachers will work with graphing calculators.

Title: Inspiration Software (SIMS)

Date: July 8, 2005

Time: 8:30 a.m. – 4:15 p.m.

Location: Missouri Southern State University

Audience: Grades 4-8 Educators

Facilitator: Deborah Pulliam, Professor of Education

Description: Inspiration software is ideal for guiding learners to think, organize and create.

Activities specific to science and math lessons will be utilized in the workshop. Participants will leave with ideas ready to use in the classroom. Get “Inspired”!

Title: ORSI 2005 Science Summer Institute (SIMS)

Date: July 11 – 15, 2005

Time: Arrive at 12:30 p.m. on Monday, June 11th and depart Friday July 15th at 11:30 a.m.

Location: Stockton Lake – Orleans Trail Resort

Audience: ORSI Science Educators Grades 5-12 (other educators will be admitted pending room availability)

Facilitators: Jack Weigers and Ann McMahon, Washington Univ. Outreach

Description: A 5-day institute focusing on concepts from the universe and physical science strands. The motion of the sun, stars and moon as they appear relative to the horizon and the change in time will be emphasized in the study of the universe.

Balanced and unbalanced forces and motion will be among topics for the physical science study.

Title: Science Kit/Content Training – Rocks & Minerals (SIMS)

Date: July 21-22, 2005

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grade 4 Educators

Facilitators: Cindy Cardin, ORSI Trainer & John Knapp, MSSU

Description: A 2-day workshop focusing on physical characteristics of rocks and minerals (and the testing of each) using the STC module investigations.

AUGUST

Title: Pre-Algebra (SIMS)

Date: August 2-3, 2005

Time: 8:30 a.m. – 4:15 p.m.

Location: Missouri Southern State University

Audience: Grades 4-8 Educators

Facilitator: Laura Adkins, Professor of Mathematics

Description: The Pre-Algebra workshop will cover such exciting topics as alternate algorithms or approaches to the basic operations, learning about math anxiety and math avoidance, using math manipulatives in the classroom, calculator activities (non-graphing at this workshop), creating math games and projects, and other fun approaches and ideas for teaching math in the middle grades.

Title: **MathThematics (SIMS)**

Date: August 8-9

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grades 6-8 Math Educators

Facilitator: Cary Tuckey

Description: This workshop focuses on teaching the curriculum *MathThematics*.

Workshop for new users will be on August 8th and 9th. Previous users will attend August 9th only.

Title: **Connected Math (SIMS)**

Date: August 8-9

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grades 6-8 Math Educators

Facilitator: Terri Doman

Description: Teachers will focus on how to effectively use the *Connected Math* materials.

SEPTEMBER:

Title: **Science Kit/Content Training – Diversity of Life (SIMS)**

Date: September 7-8

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grade 6 or any Middle School level Educator

Facilitator: Terry Shaw, FOSS & Danny Overdeer, MSSU

Description: A 2-day workshop that focuses on following concepts: structure and function, behavior, adaptation, and interactions among diverse organisms introduced in the FOSS module.

Title: **Science Kit/Content Training – Populations & Ecosystems (SIMS)**

Date: September 14-15

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grade 7 or any Middle School level Educator

Facilitator: Terry Shaw, FOSS & Dan Overdeer, MSSU

Description: A 2-day workshop. Learn how students can raise populations and organisms to discover population dynamics in a range of conditions through utilization of the FOSS module.

Title: **Implementing Math Reform in Special Education (SIMS)**

Date: September 16, 2005

Time: 8:30 a.m. – 4:15 p.m.

Location: Southwest Center

Audience: Grades K-6 Educators using *Everyday Math* or *Growing With Math*

Facilitator: Darlene Montgomery

Description: Teachers using *Everyday Math* or *Growing With Math* will focus on elements of reform in the special education classroom.

Title: **Software Tools for Teachers: Using Spreadsheet Software (SIMS)**

Date: Starts September 16, 2005

Time: Self-paced, except for arranged electronic-conferencing sessions. Expect a total time commitment of approximately six hours.

Location: Conducted using distant learning technology and e-conferencing. Participants will work from their school or home.

Audience: Grade 4-8 educators

Description: Spreadsheet software enhances inquiry-based learning by providing teachers and students with a consistent and organized template for recording observations and measurements. The sorting and graphing features of spreadsheet software help students visualize patterns and relationships. The workshop will be delivered using distant learning technology. Participants need a computer with speakers or head phones and an Internet connection running Microsoft Windows and Microsoft Excel spreadsheet software. E-conferencing software supplied for SIMS and ORSI members. No previous experience with spreadsheet software is required.

Title: **Science Kit/Content Training – Mixtures & Solutions (SIMS)**

Date: September 26-27

Time: 8:30 – 4:15 p.m.

Location: Southwest Center

Audience: Grade 4 or 5 Educator

Facilitator: Lynne Bleeker, FOSS, and Dan Marsh, MSSU

Description: A 2-day workshop. Content on the fundamental ideas of chemistry (mixture, solution, concentration, saturation, and reaction) will be emphasized as well as the instructional components of this FOSS module.

OCTOBER:

Title: **Software & Hardware Tools for Teachers – Using Sensors and Probes to Record Data (SIMS)**

Date: Starts October 14, 2005

Time: Self-paced, except for arranged electronic-conferencing sessions. Expect a total time commitment of approximately six hours.

Location: Conducted using distant learning technology and e-conferencing. Participants will work from their school or home.

Audience: Grades 4-8 Educators

Description: Participants will learn to use Vernier (<http://www.vernier.com/pkgs/elementary.html>) sensors and probes and associated software to record temperature and other variables part of an inquiry based approach to science and math teaching. Participants will receive a starter package that includes software and hardware. This Workshop will be delivered using distant learning technology. Participants need a computer with speakers or head phones and an Internet connection running Microsoft Windows. E-conferencing software and sensors supplied to SIMS and ORSI members.

NOVEMBER:

Title: **Math/Science K-12 Analysis of MAP Questions (ORSI/SIMS), Day 1**

Date: November 11, 2005

Time: 8:30 a.m. – 3:30 p.m.

Location: Southwest Center

Audience: K-12 Educators

Facilitator: Barbara St. Clair

Description: Part 1: Analyze classroom assessments to determine which GLEs and what performance level you are assessing. Participants will bring a classroom assessment to be used and will revise it to better meet the level of MAP.

JANUARY 2006:

Title: **Math/Science K-12 Analysis of MAP Questions (ORSI/SIMS), Day 2**

Date: January 13, 2006

Time: 8:30 a.m. – 3:30 p.m.

Location: Southwest Center

Audience: K-12 Educators

Facilitator: Barbara St. Clair

Description: Part 2: In this second part of “Analysis of MAP Questions” participants will examine their student’s learning from the assessment used from the Day 1 session.

E-Conferences for Math Participants

- Math e-Conferencing – 7 sessions
 - 09/12/06 – Workshop credit = 2 hours
 - 10/03/06 – Workshop credit = 2 hours
 - 11/14/06 – Workshop credit = 2 hours
 - 12/12/06 – Workshop credit = 2 hours
 - 01/16/07 – Workshop credit = 2 hours
 - 02/13/07 – Workshop credit = 2 hours
 - 03/20/07 – Workshop credit = 2 hours

E-Conferences for Science Participants

- Science e-Conferencing - 6 sessions
 - 10/26/06 – Workshop credit = 2 hours
 - 11/16/06 – Workshop credit = 2 hours
 - 12/07/06 – Workshop credit = 2 hours
 - 01/18/07 – Workshop credit = 2 hours
 - 02/01/07 – Workshop credit = 2 hours

6) Description of any substantive modifications to the original project

The most significant modification to the original project was the addition of Dr. Laura VanGilder. Dr. VanGilder provided classroom-based support by visiting the classrooms of participating teachers. This assisted the professional development with follow-up after the workshops and provided better communication between the classroom teachers and the project team. Due to Dr. VanGilder's knowledge of math and science reform and her professional experience in the classroom and in administrative work, her level of credibility in the schools was high.

7) List of state objectives and additional project objectives

- A. *Increase teacher participants knowledge and understanding of key concepts in math and/or science as aligned with each project's content focus.*

Missouri Southern State University faculty provided summer institutes for science participants in Earth Systems, Living Systems, and Matter and Energy in the summer of 2006. MSSU faculty provided a summer institute focused on the geometry strand of mathematics. Participants experience three days of training from university faculty to improve their content knowledge. The University faculty also provided content as they led participants during e-conferences through how to uncover misconceptions in the content focus areas. Professors referenced the DESE web site for those common misconceptions. In the area of mathematics, the participants were to read "Overcoming Math Anxiety" and relate how the NSF curricula helped to reduce math anxiety.

- B. *Improve teacher participant's practices in inquiry-based instruction.*

Each professional development opportunity was intended to embed the tenants of inquiry based instruction. Trainers/presenters make every effort to be "explicit" or "intentional" in terms of those tenants (as found in the Reformed Teaching Observation Protocol). An external observer visited each participant and completed the RTOP. Tie constraints did not allow for an exit conversation. However, the external observer e-mailed a set of reflection questions and some participants responded. Reflecting on practice is a critical piece to improving instruction.

- C. *Enhance participant use of assessment data to monitor the effectiveness and guide their instruction.*

Use of formative assessment for learning is a critical part of the improvement of instruction process. Participants were introduced to strategies throughout training and workshops to foster a better understanding of their use. This was a first exposure for many of them.

8) Discuss how your project has met or made progress toward meeting each of the objectives. Attach supporting data (e.g., student and teacher pre- and post-test scores, revised curricula for teacher education program based on your project, etc.)

(See Overview Data Set 5)

The professional development activities of the participants were foundational at best. If participants were to continue with the professional development activities and/or have others from their district to dialogue with and support their learning by participation, the learning may have become even more embedded into their practice. This is one reason that the next cycle for SIMS asked for teams from districts to participate as well as an administrator. Thus providing that opportunity to hear the same message and make decisions based on the same information.

a) Submit data on student achievement associated with / or attributable to the project. (Consider data provided from external evaluators, if available.) b) Discuss the assessment procedures used to gauge the achievement of objectives

(See Data Set 1-4)

9) Description of how your project was connected to specific Show-Me Standards, Grade-Level Expectations, and/or curriculum framework

The professional development activities were devised to embed practices in teaching that facilitate the standards, GLEs, and curriculum framework. The principles of learning, the 5 E's instructional model, and the NSF curricula are woven throughout the activities. Some of the professional development activities grew out of looking at MAP data to determine weaknesses in instruction; i.e., experimental design, formative assessment. Additionally, the use of technology; i.e., Inspiration/Inspire data are connected to the principles of learning which directly impact the standards and the Grade-Level Expectations.

10) Describe the dissemination of project information. Attach copies of any publications resulting from the grant, identify conferences at which the project results were presented, and identify any anticipated presentations resulting from the outcome of the project

On March 29, 2007, Dr. Jan VanGilder and Dr. Glenn Coltharp presented findings of the SIMS Project at the National Science Teachers Association Annual Conference held in St. Louis, Missouri. Participants of the presentation represented K-12 and higher education classrooms.

11) Conclusion (including lessons learned)

We feel we have made a difference with individual classrooms in the Southwest Missouri. Specific teachers in the region have an outstanding knowledge base of math and science reform and their students benefit a great deal from an inquiry-based instructional model. We feel it is needed to move to the next level in an attempt to reform entire schools. In the third year, our goal will be to involve school teams in the project. It is our hope to assist the teams in moving their schools ahead in math and science reform.

12) Attachments

Attachment A: Compliance Audit Checklist

Attachment B: Self-Reporting SIMS Data Collection

B1: Overview of SIMS Data

B2: Data Set 1

B3: Data Set 2

B4: Data Set 3

B5: Data Set 4

Attachment C: External Evaluator Data Collection

13) Annual reports should follow the same format as final reports, but must also include a section describing the next year’s activities and how those activities will build upon the foundation created in prior years

**SIMS Professional Development Plan
2007-2008**

WORKSHOP TOPIC	DATE/ LOCATION	TEACHER HOURS	INVITED PRINCIPAL PARTICIPATION	PRESENTER(S)
“How Students Learn”*	July 18, 2007 @ MSSU	7	Yes	VanGilder, Gremling, and Nichols
Reading Discussion Groups**	Oct. 10, 2007 – Math Oct. 22, 2007 - Science	7	Yes	Various
SIMS Technology Component: “GLEs” or “Data Analysis”	July 19 & 20, 2007 @ SCEE	12 (6,6)		Green, VanGilder, Gremling, and Nichols
“Coaching Your Teachers”	September 18, 2007 @ SCEE		Yes	VanGilder and DeMasters
Introduction to e-Conferencing	September 26, 2007	-	Yes	Cromwell, VanGilder
Session I: “Implementing the Student Notebook”	October 9, 2007 @ SCEE	3.5	Yes	VanGilder, Gremling, and Nichols
“How do you know it when you see it?”/ “Achieving Building Focus”	October 18, 2007 @ SCEE	6	Yes	VanGilder

“Formative Assessment”	November 7, 2007 @ SCEE	6	Yes	VanGilder, Gremling, and DeMasters
“Experimental Design/ Inspire Data”	December 11, 2007 @ SCEE	6		VanGilder, Enslow, and Cloyd
Session II: “Implementing the Student Notebook”	January 15, 2008 @ SCEE	3.5	Yes	VanGilder, Gremling, and Nichols
Session III: “Implementing the Student Notebook”	February 12, 2008 @ SCEE	3	Yes	VanGilder, Gremling, and Nichols
“Curriculum Training” #	See next page for selections	7		Various
E-Conferences ## (4 @ 1.5 hours)	#1 - Nov. 12, 2007 #2 - Jan. 9, 2008 #3 - Feb. 26, 2008 #4 - Mar. 6, 2008	6	Yes	Various
Total		60		

*: For first year teams only; ** For second- and third-year teams only.

#: Each participant will select one Curriculum Training workshop in their content area. Please see next page for selections.

##: Each of these four, 1½-hour sessions, will deal be held from 3:30 – 5:00 p.m., and participants will connect to the session from their team site.

Curriculum Training

Each SIMS participant is required to attend one Curriculum Training workshop, as indicated by the grant contract. Please review the curriculum training workshops offered for your content area, then indicate which **one** workshop you wish to attend by checking the box next to its title.

Math Content

- MathThematics for New Users**
Grades 6, 7, & 8
August 3 & 10, 2007 (2 days)
- Everyday Math (2nd Edition) for Experienced Users -**
Grades K - 6
August 7, 2007
- Everyday Math (2nd Edition) for New Users**
Grades K - 6
August 8, 2007
- Connected Math for New Users**
Grades 6, 7, & 8
August 9-10, 2007 (2 days)
- Connected Math for Experienced Users**
Grades 6, 7, & 8
August 10, 2007
- MathThematics for Experienced Users**
Grades 6, 7, & 8
August 10, 2007

Science Content

- Light – Science Kit training**
Grades 7 or 8
September 5 & 6, 2007 (2 days)
- Mixtures & Solutions – Science Kit training**
Grade 5
September 7, 2007
- Motion & Design – Science Kit training**
Grade 4
September 11, 2007
- Diversity of Life – Science Kit training**
Grade 6
September 12 & 13, 2007 (2 days)
- Our Solar System – Science Kit training**
Grade 5
September 19, 2007
- Earth In Space – Science Kit training**
Grade 8
September 20 & 21, 2007 (2 days)
- Rocks & Minerals – Science Kit training**
Grade 4
October 2, 2007
- Populations & Ecosystems – Science Kit training**
Grade 7
October 17 & 18, 2007 (2 days)