

Science & Mathematics Integration for Literacy Enhancement (Project SMILE)



What is Project SMILE?

A DR K-12 **Exploratory Project** addressing *Challenge 3: How can the ability of teachers to provide STEM education be enhanced?*

Promoting a nexus of science, mathematics and technology to inquire and solve problems of real life relevance, using modern technological tools, in middle school classrooms: That is the essence of Project SMILE!

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What are the Goals of Project SMILE?

The overarching goal of the project is two-fold:

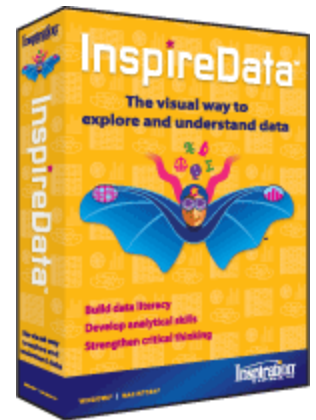
1. To promote integration of *Scientific Inquiry* with *Mathematical Problem Solving*, using InspireData, in exploring real world situations, questions, issues or problems.
2. To study the effectiveness of InspireData in enhancing teachers' ability to teach and students' ability to learn these components of STEM "literacy".

What are the Tools of Project SMILE?

In order to promote integration of *Scientific Inquiry* and *Mathematical Problem Solving*, Project SMILE has been using:

InspireData[®] Grades 4-12

as the primary instructional software



- The **Iowa Chautauqua Model** of Professional Development as the vehicle for teacher learning
- **Moodle & Mahara** e-learning software as the primary means of communication during the academic year

Mahoodle

Activities

- Assignments
- Forums
- Glossaries
- Resources

Search Forums

[Advanced search](#)

Administration

- Turn editing on
- Settings
- Assign roles
- Grades
- Groups
- Backup
- Restore
- Import
- Reset



Project SMILE
July 2010
RCOE
Appalachian State University

Science & Mathematics Integration for Literacy Enhancement

- News forum
- Question or Suggestion Forum
- Math/Science/Technology Integration Tiers
- Questions Concerning the Oil Spill
- Question Presentations for Monday Afternoon

- 29 Oct, 14:37
Pradeep Datta
[Photo Release more...](#)
- 8 Oct, 16:11
Gene Mason
[Second Online Workshop more...](#)
- 28 Sep, 22:27
Pradeep Datta
[Pre-SMILE SCOOP NOTEBOOK more...](#)
- 26 Sep, 21:30
Pradeep Datta
[The First Online Workshop more...](#)
- 27 Aug, 08:56
Jessica Howells
[Mini-Workshops more...](#)
[Older topics...](#)

Upcoming Events

There are no upcoming events

[Go to calendar...](#)
[New Event...](#)

Network Servers

- Mahara

mahara

Home Profile My Portfolio Groups Settings Logout

My Views My Files My Blogs Export

My Views

Copy of Drafts of Module One [Delete this View](#)

Copy of Drafts of Module One
 Edit View details | Edit this View | Edit View access
 Alternate: ModuleOneDraftJuly2010, feat. 1 file
 Only you can see this View

InspireData Samples [Delete this View](#)

InspireData Samples
 Edit View details | Edit this View | Edit View access
 Alternate: Datasets of Thevial after... FMS
 Activity: Improved WIL, Student Conception of...
 Who can see this View: Friends, Mahara Admin, Only Larson, John Sengstack, Jessica Howells, Joe Best, John SMILE, David Butler, Vicki Gruesz, Shaky Sharma, Sarah Cook, Pat Simpson, Lauren Bitchel, Kaley F., Emily Barnes, Jessica W., Stacy Charan, Michael...
 (Last 10 invited)

Gene Moore (viewing)
 You have logged in from [Project_Smile](#)

Groups:

- SMILE Team (Admin)
- Participants (Admin)
- Module One Reviewer

Online users (Last 10 invited)

The Essence of Project SMILE

Iowa Chautauqua Model

Development
of Teachers'
Content
Knowledge

Development
of Teachers'
Pedagogical
Knowledge

Integrated Science and Math

STS

Problem Solving
as Modeling

Inspire Data

Classroom Practice

Students' Learning
Progressions

Analysis of
Classroom
Discourse

Analysis of
Students' Work

Teacher Learning Questions

- To what extent can *InspireData* improve the integration of scientific inquiry with mathematical problem solving in exploring real world situations, issues and questions in grades 6 – 8 math and science classes?
- To what extent can professional development focused on integration of science and mathematics instruction, mediated by *InspireData*, enhance middle school teachers' ability to teach scientific inquiry and mathematical problem solving?

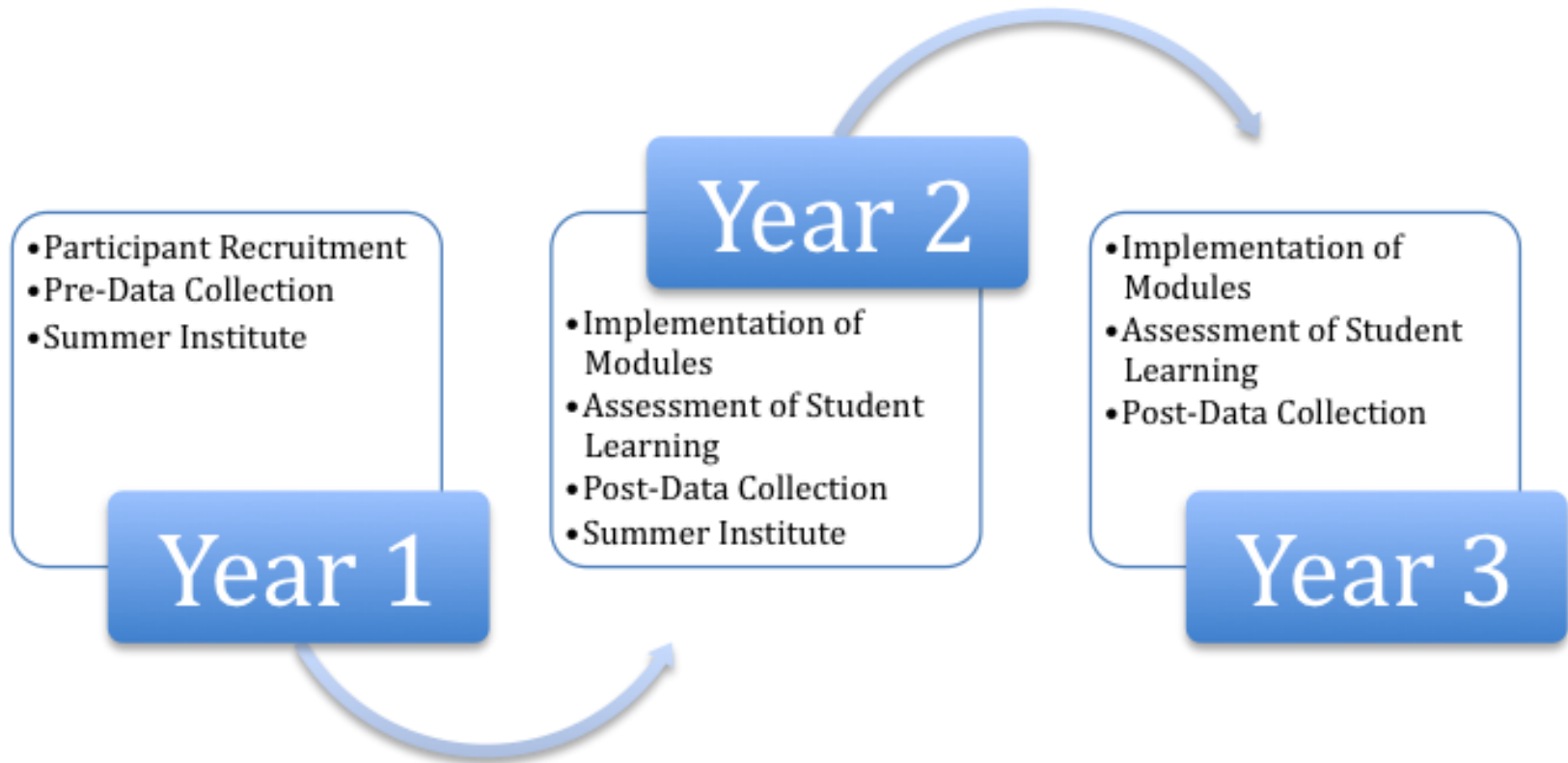
Student Learning Questions

- To what extent can an integrated math and science curriculum that emphasizes technological tool use in applied learning improve students' scores on math and science achievement, compared to current instructional practices?
- What changes are evident among students whose teachers become involved in Project SMILE? To what extent can an integrated math and science curriculum that emphasizes technological tool use in applied learning improve students' motivation and attitudes toward math and science, compared to current instructional practices?

Who are the Participants in Project SMILE?

- 15 Middle Grades (grades 6 – 8) In-Service Teachers who teach Either Science or Mathematics or Both
- 7 Schools from 6 Counties (School Districts) Participating

What is Project SMILE's Plan of Action?



Project SMILE Summer Institute

Three-Week Summer Institute to:

- Experience a math-science integrated module designed using STMS pedagogy
- Learn to use *InspireData* to collect, analyze and visualize data within the module
- Develop an integrated module for use in teachers' own classrooms

Summer Institute in Progress



The SMTS Pedagogy

Science Mathematics Technology and Society

The INVITATION Phase:

What, in your opinion is the most significant news event you have heard/seen/read lately?

The EXPLORATION Phase:

Groups were asked to brainstorm possible ways of gathering/generating information that will help answer their particular question.

The SMTS Pedagogy

Science Mathematics Technology and Society

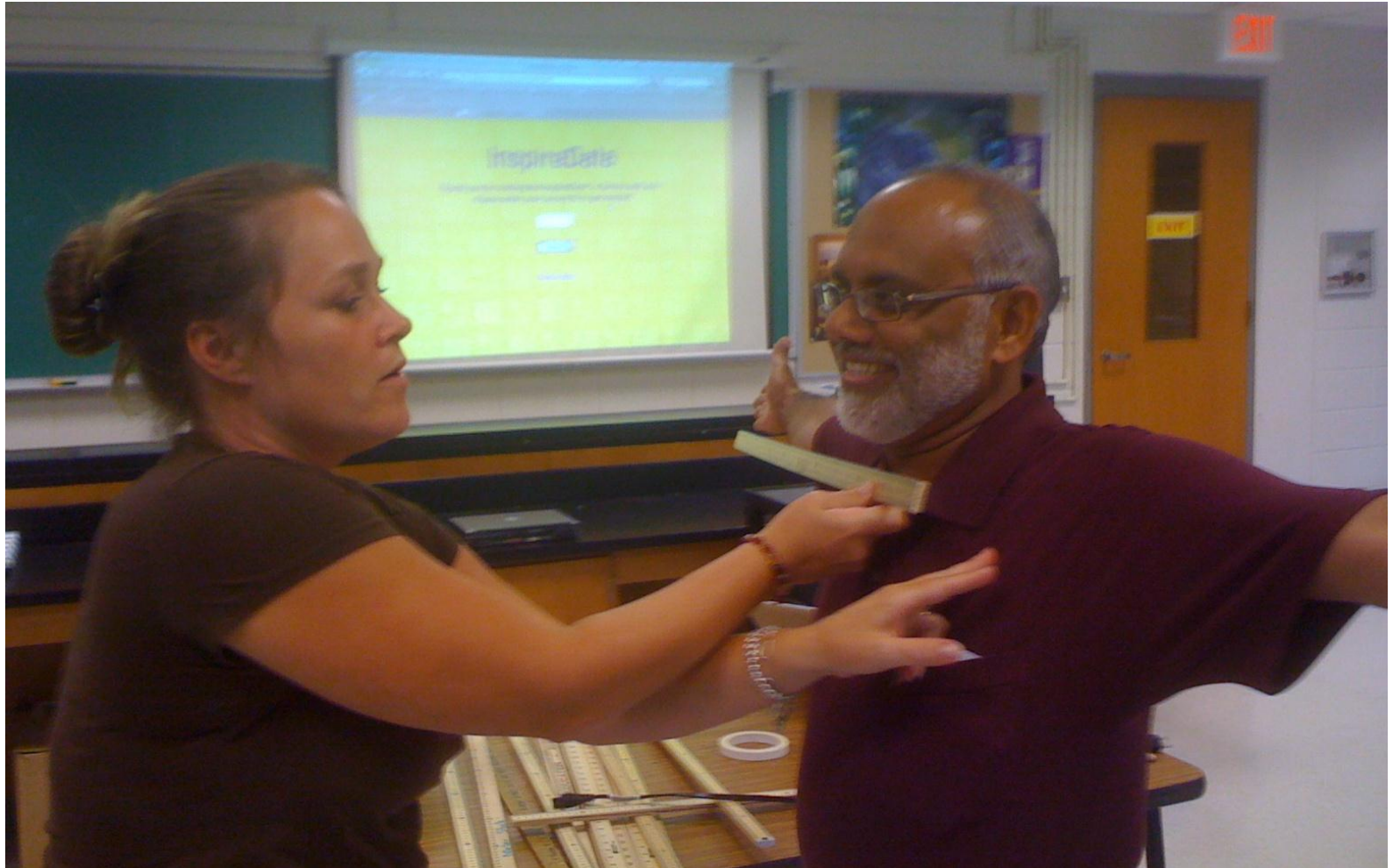
The EXPLANATION Phase:

Participant groups make presentations of the results of their data and findings, etc.

The TAKING ACTION Phase:

Participant teachers brainstorm about how middle school students might use the scientific and mathematical knowledge gained through this module?

Data Analysis with InspireData



InspireData Data Table

AAA				
◆ Sorbent	Sorbent Effectiveness			Mean of all trials
	trial 1	trial 2	trial 3	
◆ Blue To...	2	2	2.5	2.17
◆ Hair	0.16	0.16	0.16	0.16
◆ Paper T...	5	5	4	4.67
◆ litter	7	6.5	6.5	6.67
◆ Hair	6.25	6.25	5	5.83
◆ Cotton	5	5	5.5	5.17
◆ Hair	4.67	5.5	6.11	5.43
◆ Hair	6	6	6	6.00



Effectiveness of Various Sorbents to absorb oil

Sorbent: Hair
Cotton
Paper Towels
litter
Blue Towel
sponge

12

8

4

Hair litter Cotton Blue Towel Paper Towels sponge

Sorbent



Teacher Data

- Teacher Survey Questionnaire (Pre-Post)
- Focus Group Interviews (Pre-Post)
- SCOOP Notebook
- Classroom Observations/Videos analyzed through Reformed Teaching Observation Protocol (RTOP)
- Inquiry Questionnaire (end of year)

Student Data

- North Carolina End-of-Grade Exam Scores
- Inquiry Questionnaire
- Modified Attitudes toward Science Inventory

What is Project SMILE Data Analysis Approach?

Progressive Comparison Analysis:

- Data are being analyzed using appropriate Statistical and Qualitative methods
- Comparison of data analysis results from Pre-data to first year, to second year, and to third year in order to document progress and change toward project goal accomplishment

What are Project SMILE's “Deliverables”?

- Production of several math-science *integrated instructional modules* based on real world situations, issues, problems and questions, focusing on major content objectives in North Carolina Standard Course of Study for Mathematics and Science
- A *web-based repository* of Instructional Modules for reference and use by other teachers

Examples of Teacher Generated Modules

- **Bacteria: Can we be Friends?**
An exploration of Microbiology content in 8th grade science and math classes
- **CSI: Scientific Method and Problem Solving.**
An exploration of the “inquiry” goals in 7th grade science class
- **Water Quality: How good is our water supply?**
An exploration of part of the Hydrosphere goals in 8th grade science and math classes
- **Energy Sources: Alternatives to Oil!**
An exploration of alternative energy sources in 8th grade science class