GLOBE Program in Creating Learning Communities in Learning Science

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National Science Education Standards

- This GLOBE Study promoted:
  -**Teachers' teaching** (Standard 1) by teaching the environmental sciences,
  -**Professional development** (Standard 4) by participating a series of training workshop to become a GLOBE teacher,
  -**Collaboration** (Standard 6) by working with people at all levels around the world on a daily basis (NRC, 1996).

Generic Information about GLOBE

(Global Learning and Observations to Benefit the Environment)

(Announced in April 22 on Earth Day 1994 by Vice President Al Gore, Began operations on Earth Day 1995)

What is GLOBE?

- Worldwide hands-on, primary and secondary school-based education and science program.
- Promotes and supports students, teachers and scientists to collaborate on inquiry-based investigations of the environment and the Earth System - NSF & NASA.
- GOALS:
  (a) Improve science education;
  (b) Increase scientific understanding of the Earth as a system;
  (c) Enhance environmental awareness of individuals worldwide.

Partnership in Learning Communities

- **GLOBE Funding Sources:**
  -National Aeronautics and Space Administration (NASA)
  -National Science Foundation (NSF),
  - U.S. Department of State,
- **GLOBE implementation:**
  - Through a cooperative agreement between NASA, the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado and Colorado State University in Fort Collins, Colorado.
- **GLOBE Learning Partnership:**
  -Colleges and Universities, State and Local School Systems, and Non-government Organizations.
  -Internationally, GLOBE is a partnership between the United States and over 100 countries that manage and support their unique national and regional program infrastructure and activities.

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Who is involved in GLOBE?

- Representatives from **111** participating countries and **139** U.S. Partners coordinate GLOBE activities that are integrated into their **local and regional communities**.
- More than **50000** GLOBE-trained teachers representing over **20000** schools around the world.
- GLOBE students have contributed more than **20 million measurements** to the GLOBE data base for use in their inquiry-based science projects.

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What is the Value of GLOBE?

- **For Students**, GLOBE provides the opportunity to learn by:

- Taking scientifically valid **measurements** in the fields of atmosphere, hydrology, soils, and land cover/phenology - depending upon their local curricula
- Reporting their **data** through the Internet
- Publishing their **research projects** based on GLOBE data and protocols
- Creating **maps and graphs** on the free interactive Web site to analyze data sets
- **Collaborating** with scientists and other GLOBE students around the world

Issues and Problems

in Teacher Learning and In-service Teachers Professional Development/Training

- Lecture-type & isolated skills training (van Driel, Beijaard, & Verloop, 2001)
- Inadequate curriculum that prepares students for the future (Millar & Osborne, 1998)
- US science and math teachers (Schmidt, McKnight, & Raizen, 1997) use a science curriculum in a different way from what reform goals (AAAS, 1993; NRC, 1996)

- Teachers Training has little effect on their learning (Smylie, 1989)
- Ineffective Professional Development (Gusky, 1986)

Possible Solution

High-quality Professional Development:

a “forms-of-action” approach (paradigm shift) (Supovitz, & Turner, 2000; Norris, 1984)

like GLOBE

Research Question

(1) How do teachers and students build up a learning community (teachers, students, parents, community leaders around the world) through the GLOBE activities for science learning?

(2) What do they learn in the process of inquiry-based science activities in GLOBE?

Research Question

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Method

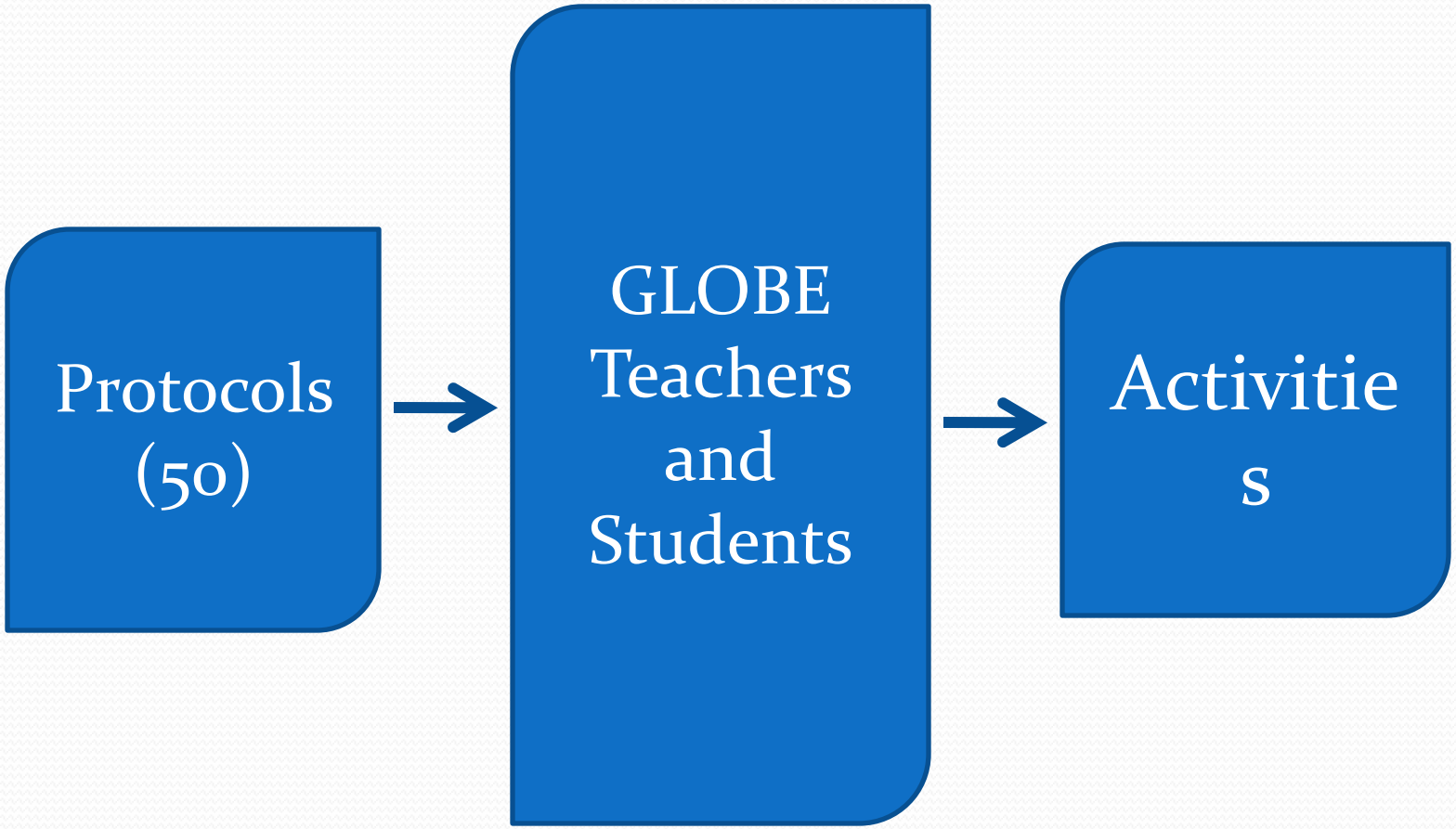
- **Sample:**
  4th (N=5) and 5th graders (N=7) in science class
- **Data Collection:**
  3 Protocols
  6 focus group interviews of students;
  6 observations of 6 students' GLOBE activities;
  2 interviews of teacher;
  Artifacts – reports, episodes, field notes, etc

Context of the study

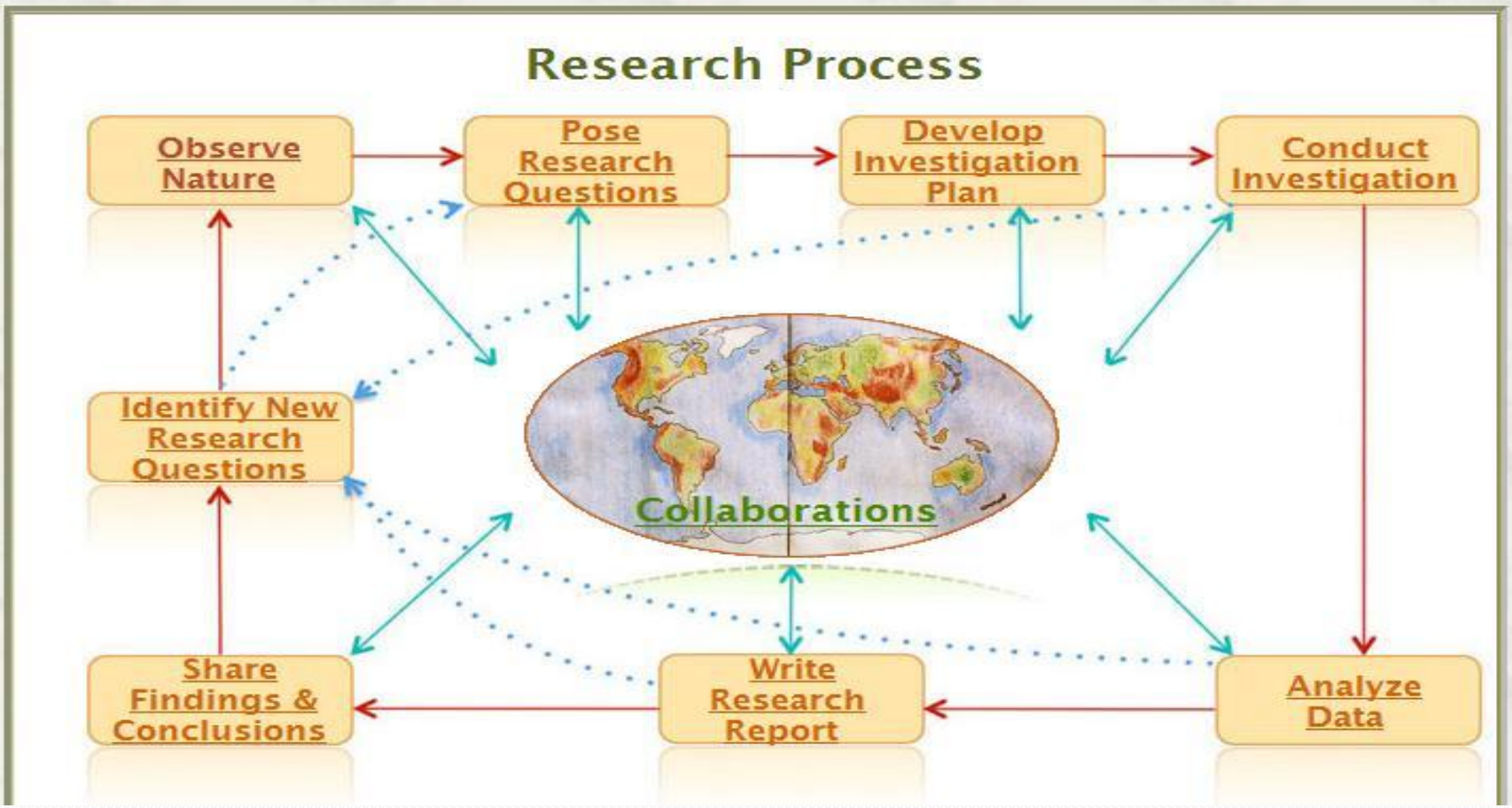
- GLOBE site - data entry point - using GLOBE protocols
- GLOBE teacher - a local school science teacher teaching 4th and 5th grade science - **trained** to be a GLOBE teacher through a GLOBE workshop.
- GLOBE protocols to gather (1) soil and (2) surface temperature, and (3) weather data including temperature, cloud type, and humidity around the school on a daily basis.
- Students worked with K-16 educators in the U.S. and the world
- The project built a network around those who have similar interests around the community and the world through the technologies.
- Establishing the network for promoting science learning,
- Keep monitoring with an update with worldwide K-16 educators in each area of interests.

- This project that used the world-connected network over a semester reports how teachers and students worked together as a learning community and how it impact their learning and attitudes toward environmental science and students' parents' conversation involved throughout the program.

Process of GLOBE Science Education



For Students



Cont'd

- **Data Analysis**: Cross-case analysis (Maxwell, 1996) – search for common experiences, themes, or outcomes, AND
  coded thematically to answer the RQs (Strauss & Corbin, 1990), AND
  statements and interpretations were member-checked by the two experts and constructed meaning from it (Guba & Lincoln, 1989).

GLOBE Data Entry

Illinois State University

* = *These inputs are required.*

Current Date: 2010 February 16

***Measurement Date:**

Year: Select **Month:** Select **Day:**

***Name of Site:**

Create a unique name that describes the location of your site.

FSA

***Coordinates:**

(School Location:
Latitude : 40.5353 deg North
Longitude : 88.9848 deg West
Elevation : 261 meters
Source of data : (GLOBE Server)

Use these current School Location coordinates

Source of data: ◉ **GPS** ○ **Other Data Source**
(accuracy equivalent to GPS)

Average your Coordinates

Latitude: 40.50000 deg ◉ **North** ○ **South** of the Equator
(Enter the data in the format 56.8462 deg and mark whether it is North or South.)

Longitude: 88.90000 deg ○ **East** ◉ **West** of the Prime Meridian
(Enter the data in the format 102.9073 deg and mark whether it is East or West.)

Elevation: 261 meters

Please supply as much of the following information as you can now. When you obtain additional information click on "Define/Edit a Study Site" and click on the name of the site to update it.

Obstacles : (Obstacles are trees, buildings, etc. that appear above 14 degrees elevation angle when viewed from the site.)

○ No Obstacles | ◉ Obstacles [Clear Radio Buttons]

Description :

There was a building by my site

Height of the top of the rain gauge : cm

Height of the clip in the ozone measurement station : cm

Height of the sensor or bulb of your max/min thermometer : cm

Surface Cover Under Instrument Shelter : Paved

if "Other" or "Roof" describe below

Description :

cement

***Type of Thermometer at this site:** No Thermometer

General description of your study

Send Data Erase

- No Thermometer
- Liquid-Filled Max/Min (U-tube)
- Digital Multi-Day Max/Min
- Digital Single-Day Max/Min
- AWS WeatherBug Station
- Davis Instrument
- Data Logger (HOBO)
- Liquid-Filled, Current Temperature Only
- No Thermometer
- Rainwise

Therm_Type

Cont'd

- Protocols:

  -Surface Temp.

  -Soil Temp.

  -Weather Data

Results

What Teachers and Students Said About GLOBE?

- Students work on a project that could impact the entire Heart of Illinois, and far beyond.
- These fourth and fifth graders are really into their data collection.
- Everyday they're gathering data on the atmosphere, clouds, and the weather.

Teacher's quotes

- "We study atmosphere and clouds in science but this is carrying it a little bit further making it real to kids," said GLOBE teacher.
- This school is one of the U.S GLOBE partners since 2007. Children in 4^{th} and 5^{th} grades are collecting scientific research about the environment.

Teacher’s quote

- “Doing something with a university, contributing to a global project, and having so much fun they're giving up their recess to be a part of it” said the GLOBE teacher.
- "I see they're making connections outside the classroom, they're noticing things, they're coming back to school and saying oh I saw all these different types of weather," said the teacher.

Students' quotes

- Future career:
  "My mom is a nurse, and I want to be a nurse in the future, too. Measuring temperature everyday really helps me and is fun 'cause my mom does it all the time" - fifth grader.
- Daily application:
  "Weather forecast on newspapers is not quite right. I think it is because the newspaper came out one day behind. So I looked at the sky and clouds and predict what the weather will be like" – 5th grader

Students' quotes

- Clouds:
  "You know, I looked up the sky and when I saw the clouds in my mom's car, I figure out the type. Today it looked like alto cumulous, if I am right" – 4th grader
- Argumentation (used pseudonyms):
  "You know, Amy's always in a fight. She is really pushing herself with her own opinions. She never accepted others' opinions," "We take it to Ms. Smith when we did not solve the arguments among us" – 4th grader

Students' quotes

- GLOBE:
  "I really like science. I never liked science until I started gathering data outside of the classroom during recess time. I don't care recess time. But I love GLOBE activities and it's really fun taking soil temperature, surface temperature, and we measure even two digits of a significant number" – 5th grader

Students' quotes

- "It is just fun because you can go outside and mess with the snow and rain. I've never really done this before until this year, it's really kind of fun" - fourth grader.
- "It's pretty cool because we get to submit it to Colorado State University, so I actually get to do something with a university" – fourth grader."

Conclusion

- **This GLOBE study** brought together students, teachers and scientists through the GLOBE **School Network** in support of student learning and research.
- **Parents and other community members** often work with teachers to help students obtain data on days when schools are not open.
- While this local project is improving kids knowledge about science, it's really trying **improve the world's knowledge about the globe**