

Introduction

We focus on presenting to 5th grade students the basics of the geological sciences, and in a more general sense scientific inquiry. We want to show young children that science can be fun, and that they have more options for their future careers than they may realize. We try to make the presentations fall on dates where a male and female can present together. The reason for this is to show the young girls that anyone, not just old white men, can be a scientist. Eventually we hope to expand into other nearby regions as students and professionals show us they are willing to help, present, and fund this endeavor.

The presentations entail: approximately 1h in length, to no more than 30 children at a time

Providing Texas Rock kits purchased from the Bureau of Economic Geology in Austin, in the form of a class set of approximately 30 kits, for use during the presentation and as a gift to each individual school for future use.

A framed and mounted Geologic Map of the state of Texas (initially a poster)

Fossils - what they are and how they form (provide free-of-charge fossils collected and given to aid this program), with an accompanying geologic time scale to show how old they are (plus an additional exceptional specimen of a rock/fossil to reward the smarter children)

Oral presentation focused on:

- Introductions
- Ask the students what they think geologists actually do
- What are minerals and how you can identify them
- What are the three kind of rocks and how they form, including physical properties of some
- Touch on rock cycle, as time permits
- Fossils: for example, gastropods (snail-like creatures from the Cretaceous), what they are and how they form, and other interesting notes as time allows.
- Describing geologic maps and what they can tell us
- Fluorescent minerals and rocks, at the end of the presentation showing the students a set of "glow in the dark rocks"
- What can you do as a geologist, professions around the world

One of the most important aspects of our program is getting the children involved with the presentation, instead of just talking at them for an hour. The majority of the time spent at the schools involves having the children examine rocks, minerals, and fossils as we instruct them how.

Methods/Methodology

Theory:

Developed in regard to established educational research practices and methods, and residing in a combination of both the grounded and critical theoretical domains.

Ontological effects are largely ignored when assessing the participants (teachers and presenters).

We as the presenter/researcher have to understand where we fall within the framework of the data collection and analysis process: active participant, passive observer, active observer, etc.

We are active participants or "action researchers (Fig, 2011)"

Research Plan:

Institutional Review Board approval is required to perform any assessment or research on or from human participants.

Development of a research plan and protocol for implementation of data collection
Anonymous surveys to remove bias
Reflective surveys for the teachers from the participating schools
Reflective surveys for the geologists presenting at the schools
Surveys are based off of a 1 – 4 scale system, allowing for comparison between schools



Data

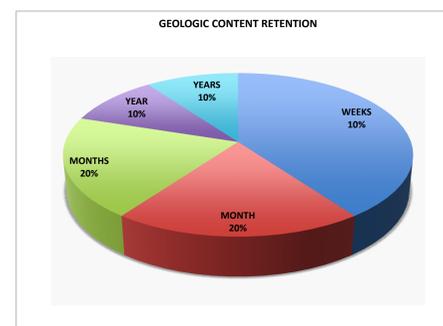
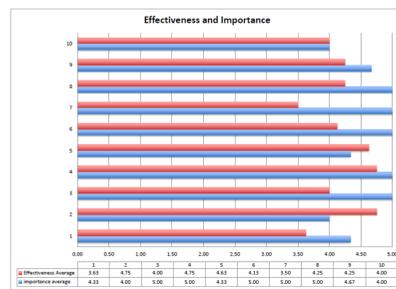
Teacher #	Importance Q1	Importance Q2	Importance Q3	Effectiveness Q1	Effectiveness Q2	Effectiveness Q3	Effectiveness Q4	Effectiveness Q5	Effectiveness Q6	Effectiveness Q7	Effectiveness Q8
1	5	4	4	3	2	4	4	4	4	4	4
2	5	4	3	4	5	4	5	5	5	5	5
5	5	5	5	5	5	5	5	5	5	5	5
6	5	5	5	5	5	3	5	5	5	5	5
7	5	4	4	4	5	4	5	5	5	5	4
8	5	5	5	5	5	3	4	4	5	4	3
9	5	5	5	3	4	3	3	4	5	3	3
10	5	5	5	4	4	4	4	5	5	4	4
11	5	4	5	5	4	4	4	4	5	4	4
12	4	4	4	4	4	4	4	4	4	4	4

Teacher #	Stuck with them Q1	Stuck with them Q2	Stuck with them Q3	Stuck with them Q4	scaled Q1	scaled Q2	scaled Q3	scaled Q4
1	week	months	months	multiple weeks	1	4	4	2
2	months	month	months	months	4	3	4	4
5	months	months	years	years	4	4	6	6
6	weeks	weeks	weeks	weeks	2	2	2	2
7	week	week	months	year	1	1	4	5
8	week	months	months	months	1	4	4	4
9	week	weeks	months	month	1	2	4	3
10	week	week	weeks	weeks	1	1	2	2
11	week	week	weeks	weeks	1	1	2	2
12	month	month	month	month	3	3	3	3

Participant #	Effectiveness Q1	Effectiveness Q2	Effectiveness Q3	Effectiveness Q4	Effectiveness Q5	Effectiveness Q6	Communication Q1	Communication Q2	Communication Q3	Communication Q4
1	3	4	3	3	2	2	2	3	4	4
3	4	4	3	4	4	4	4	4	4	4
4	3	4	2	4	4	3	2	2	2	3
6	4	4	2	4	4	2	4	4	4	4
10	4	4	3	4	4	4	4	4	4	4
13	3	4	3	4	4	4	3	4	2	2
16	4	4	4	4	3	4	4	4	4	missing
17	4	4	2	3	3	2	3	2	3	4
18	4	4	4	4	4	4	4	4	3	4
19	4	4	4	4	3	4	4	4	3	4
20	4	4	4	4	4	4	4	4	4	4

- Participant and teacher survey data collected from Dec. 2015 - present
- IRB protocol number: 16136-EX
- Effectiveness of the program at presenting new earth science relevant materials in a class session
- Effectiveness of the program at encouraging/facilitating a first hand exploration of the scientific method
- Self-reflective assessment of the utility of participating as a presenter in regard to communicative development

Results

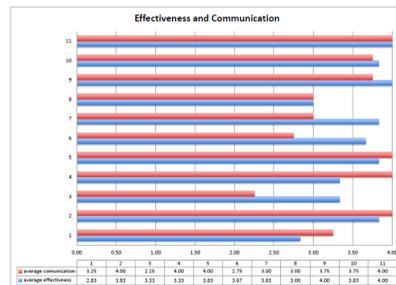


Teacher Data

Effectiveness of the program was evaluated from the teacher's perspective in regard to:

- Content retention rates of the elementary school students
- Activity participation rates of the elementary school students
- These rates range from around one (1) week up to multiple years

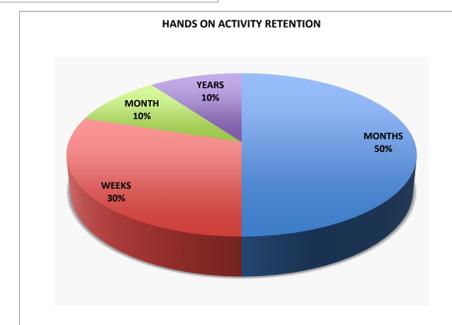
We also evaluated the perceived general importance of the program, impact of meeting real scientists, and effectiveness of our attempts at removing any gender and socio-economic stereotypes associated with scientific careers



Participant Data:

Participants were asked to evaluate their participation in the program, and how it helped, hindered, or had no effect on their communicative ability. The data was then combined to form a general relationship between the following:

- Impact on the presenter's ability to communicate complex scientific material to a novice learner
- Impact on the presenter's personal development of their present/future teaching philosophy



Conclusions

Independent of any metric developed to analyze and associate the data collected the preponderance of evidence shows:

- A positive view of the program from the teacher's perspective
- A positive view of the program from the presenter's perspective

An indirect measure of the students (elementary school children) showing a positive view via the teacher's responses

In the future, further evaluation of longer term data sets are needed before any concrete correlations can be inferred

"I really do like the TerraElm initiative and look forward to participating again. People don't realize how hard it is to communicate certain concepts to elementary school children and have them understand it. The experience opened my eyes and has helped me tremendously with my physical Geology teaching assignment this semester as for most of my students this is also their first introduction to Geology."
-presenter # 16

"I really hope this program becomes established to the point that when Peter leaves someone can take over. The most challenging part will be funding, but I think the right steps are being taken (like getting feedback). I wonder about NSF opportunities in education. Usually they're all about funding educational opportunities, especially to young and diverse groups."
-presenter # 10

"I felt that the presentation was very well done. It gets better every year. The pace of the talk was just right and just the fact that a real scientist is talking to them about the same material we have makes a big difference."
-teacher # 8

"I love when the geologist comes to visit our students. They need to be exposed to various forms of scientists and careers. I wish that he would bring a female geologist with him. He's tried for the last couple of years but she has always canceled and he has come by himself."
-teacher # 1