Session II

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Action Research in the Science Classroom

Updates

- **Let's discuss…**
- Brief summary of what your study is about.
- How is your study going?
- What are your successes so far?
- What are your struggles so far?
- What challenges are you expecting?

Session II Overview

- Literature review: Next steps
- Question development
- Introduction to qualitative research
  - Data collection methods
  - Looking ahead to data analysis
  - Ethical considerations
- Brief discussion of concerns

Credit: NASA

Literature Reviews – next steps

- Expand in sections
- Add to review as your research progresses, questions shift, etc.

Question Development

- What problem are you trying to address?
- What will your intervention be?

Map of Reina's starting point.

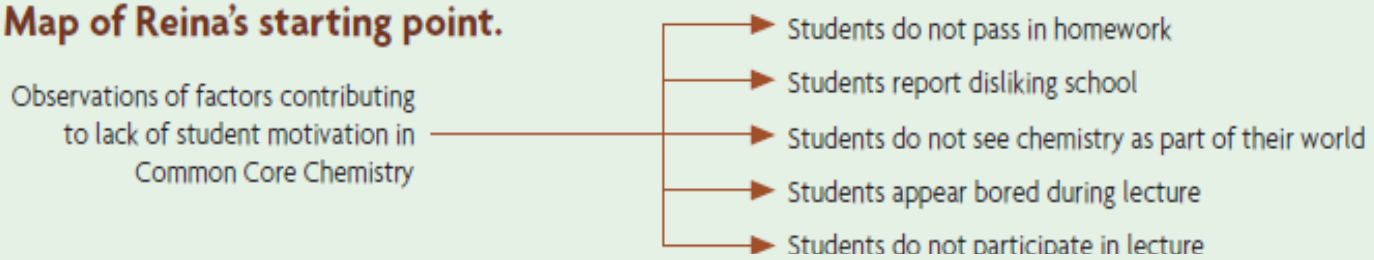
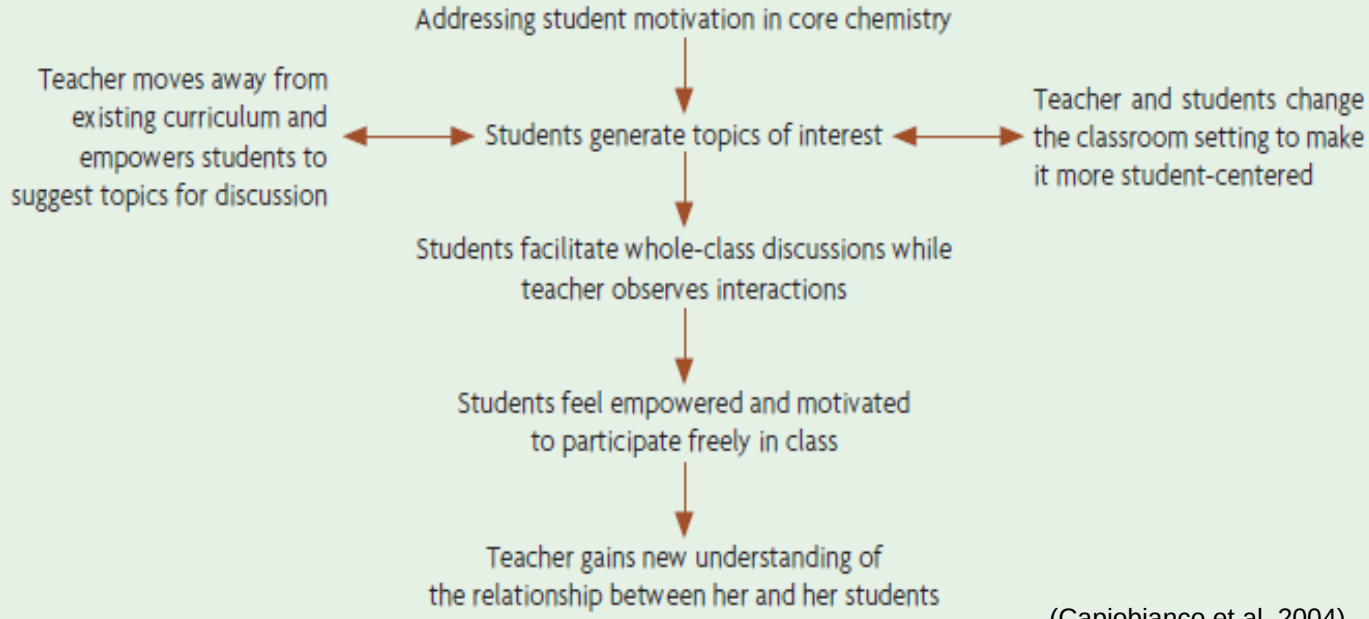


Diagram of Reina's action plan in core chemistry.



(Capiobianco et al, 2004)

Question Development

- Only one or two questions
- Question may change over the course of your study so do not feel like you are boxed in
- Should be specific, yet open-ended enough to allow for data to direct your analysis
- Should be answerable from your data!
- Must be important and new

Qualitative Research

- Inductive
- Strong attention to details
- Interpretive, interested in meanings
- Small sample size
- Contextual
- In-depth/descriptive
- Naturalistic
- Not meant to be generalized for all cases, but instead serve as an observed phenomena

Quantitative Mode	Qualitative mode
Assumptions • Social facts have an objective reality • Primacy of method • Variables can be identified and relationships measured • Etic (outside's point of view)	**Assumptions** • Reality is socially constructed • Primacy of subject matter • Variables are complex, interwoven, and difficult to measure • Emic (insider's point of view)
Purpose • Generalizability • Prediction • Causal explanations	**Purpose** • Contextualization • Interpretation • Understanding actors' perspectives
Approach • Begins with hypotheses and theories • Manipulation and control • Uses formal instruments • Experimentation • Deductive • Component analysis • Seeks consensus, the norm • Reduces data to numerical indices • Abstract language in write-up	**Approach** • Ends with hypotheses and grounded theory • Emergence and portrayal • Researcher as instrument • Naturalistic • Inductive • Searches for patterns • Seeks pluralism, complexity • Makes minor use of numerical indices • Descriptive write-up
Researcher Role • Detachment and impartiality • Objective portrayal	**Researcher Role** • Personal involvement and partiality • Empathic understanding

(Glesne & Peshkin,1992)

http://oldweb.madison.k12.wi.us/sod/car/cartechniques.html

CLASSROOM ACTION RESEARCH

Techniques for Gathering Data

1. **Interviews** with students, parents, teachers
2. **Checklists** of skills, behaviors, abilities, movement, procedures, interactions, resources
3. **Portfolios** of a range of work from students of different abilities around a particular topic; a representation of a total experience; a collection of documents for analy
4. **Individual files** of students' work (e.g., tapes, samples of work, art work, memos, photos of models/projects, reports), of students' opinions; of student attitudes,
5. **Diaries/journals** written by teachers, students, parents, class groups, teachers
6. **Field notes/observation records** - informal notes written by a teacher
7. **Logs** of meetings, lessons, excursions, school expectations, material used
8. **Student-teacher discussion/interaction** - records of comments and thoughts generated by students
9. **Questionnaires** of attitudes, opinions, preferences, information
10. **Audiotapes** of meetings, discussions in class or about data gathered, games, group work, interviews, whole class groups, monologues, readings, lectures, demonstr
11. **Videotapes** of classrooms, lessons, groups, demonstrations, a day in a school, lunch times
12. **Still photography** of groups working, classrooms, faces, particular students over time, at fixed intervals in a lesson
13. **Time-on-task analysis** of students, teachers; over a lesson, a day, a week

Data Sources

Poll: What types of data sources are you considering for your study?

What did you like about Coach Sumrall's visit and why?

I never had been interested in astronomy until this presentation. I loved how he went in depth talking about the planets and the stars. I was fascinated by the Stellarium program. It was really cool how he would find the constellations. I really liked how he knew what he was talking about. He made learning about stars + planets so much more intriguing and fanscinating. Overall, this was a great presentation and I enjoyed it! I hope he soon comes back again!

Photographs

Interviews

I: And what is a front, exactly?

E: Um, a front is where the warm air, it's like the . . (drawing line in the air)

I: It's ok, someone can help you out.

D: It's where the warm air and cold air meet.

I: And what happens at a front usually? When there are two types of air meeting?

M: Like, uh, rain or something?

I: Why does rain happen there?

A: Because the warm air has a lot of humidity in it, and the cold air sinks because it is more dense. And the warm air wants to get cold and go back to the bottom. And then the rain starts dripping down.

I: What's happening to the warm air?

J: At the cold front, the cold air goes underneath when they bump into each other, and the warm air goes up and the cold air goes down. The warm air will stay up above the cold air molecules and the cold air has the clouds, it brought the clouds. The cold front will bring the thunderstorm, rain clouds, hail clouds, snow clouds.

I: . . . so tell me, what do you like about 3D VIEW?

C: I like the 3D-VIEW because you can actually see it. You can see it popping out of the screen and it helps a lot . . . because you see, it has like arrows point in the directions, like when the heat comes out and how the cloud . . . how does it form.

O: Um, at the same time it's fun . . . at the same time we're learning as we're having fun. Like she said, it shows you the arrows of how it's forming, and in a book, it's just a picture of it. Not many stuff on it, like on the 3D-VIEW.

V: It's better than a book. It helps explain more. It helps you understand better.

I: Give me an example of something it helps you to understand better.

V: Like, I kinda didn't really understand volcanoes, or hot spots, or plates. But, when I saw the 3D, it kinda made me think that—how do they form? It helped me understand how the plates move and how the hotspots create more volcanoes . . .

I: Thanks. Any other thoughts?

. . . . would you recommend this program to other students?

All nod.

I: I see some nods . . . but tell me why!

V: I say yes! It helps the students understand more, and it's better than reading a book. Um, having these pictures to show you how things are happening.

J: I would recommend the 3D to other students because it's like more better, more funner, and you can actually go on the computer and stuff instead of working at your table all day.

I: What makes it more fun?

J: Instead of just sitting at the table doing our work for the whole class period, we can actually go onto the computer and study like, pictures of the water cycle, or anything, fossils, all those things.

I: But it's still work, right? You're still learning science. What makes it different?

M: That it's a lot better than the teacher.

I: (laughs). I don't know if she'd agree with that. . . . I think that what a lot of you are saying is that you really see things happening. Can someone give me another example of something you understood better when you saw it in 3D?

E: What happens when the sunlight hits a solid object.

I: like what kind of object?

E: Like people outside, and what happens when a sunbeam hits it.

I: What does happen?

E: All the molecules are warming up and moving, like a table. So, if you touch it, it will be warm.

I: Nice. Keisha, did you want to share something that you understand better in 3D?

K: Like, in 3D, you can really understand the motion. How it's moving. Like when it was going up, and then down.

C: Sometimes when the teacher tries to explain something, and she goes on the 3D-VIEW and, on the white board, you can see what's actually happening . . . like the tornado thing. She showed it to us on the whiteboard! She had to go on the 3D website.

A: Like, if you're going to do like a map. We usually have paper in black and white and you would know what's the difference between this temperature and the other temperature. On the computer, like, we can see the difference.

D: And then, the teacher would try to draw it on the board, but we still wouldn't see exactly how it would look.

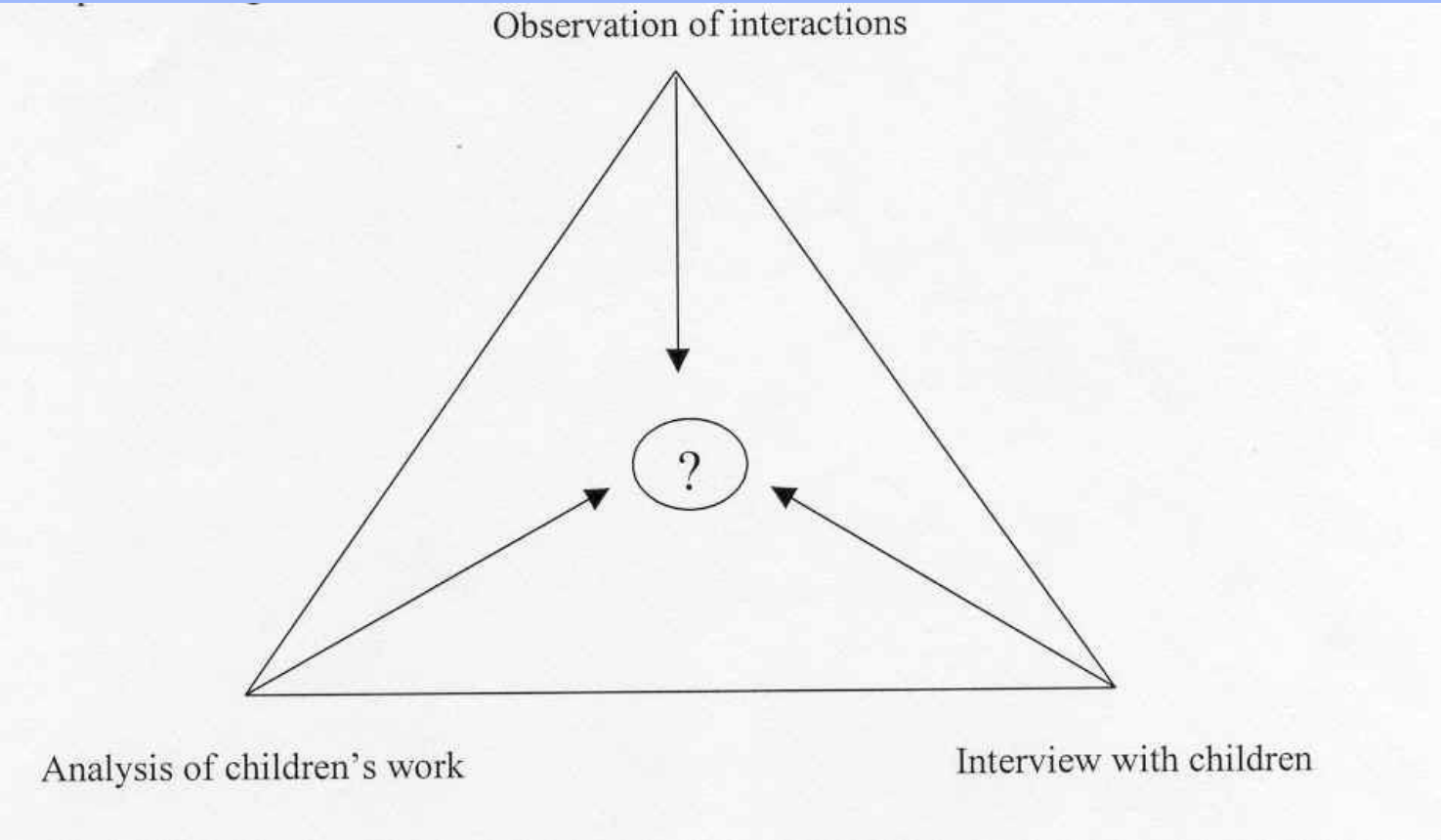
Elements of Rigor in Qualitative Research

- Triangulation of Data Sources
- Member Checking
- Peer debriefing
- Rigor in Analysis Techniques

***** Should all be mentioned in your analysis*******

Credits: Library of Congress & GLOBE program

Example of Triangulation in Action Research



Ethics in Research

- Issues relating directly to your study
- Protecting students
- Consent forms

Credit: Hope College Department of Education

Ethics in Research

General guidelines

- You have a responsibility to teach your class well. Conducting research should not be allowed to get in the way of teaching.
- Think through your research procedures carefully. Is there any way that any student could be angered or embarassed by participating?
- Students should not be required to participate in any procedures that are outside of usual classroom practice (such as surveys, interviews, special testing). It should be clear that they will not be penalized if they do not participate.
- Students should be asked for their informed consent for any procedures that are outside of usual classroom practice. Write a brief description of your planned research activities and ask them to sign it if they agree to participate. (See below for a special note to K-12 teachers)
- Students should be assured of their anonymity. When collecting data in addition to the standard course assessments (such as surveys, etc.) you should be sure that res are anonymous. When describing your students, you should take care to disguise their identity.
- Follow any institutional guidelines (see below) for classroom research. Going through those channels gives you extra assurance that your procedures are ethical.

Special notes for K-12 teacher-researchers

In addition to the above guidelines, you should also:

- Describe your project with your principal. She or he can help you spot potential ethical problems. Your principal also needs to know about the project in order to discuss any parents who may have questions.
- Because you are working with children, you must get informed consent from their PARENT for any procedures that are outside of usual classroom practice.

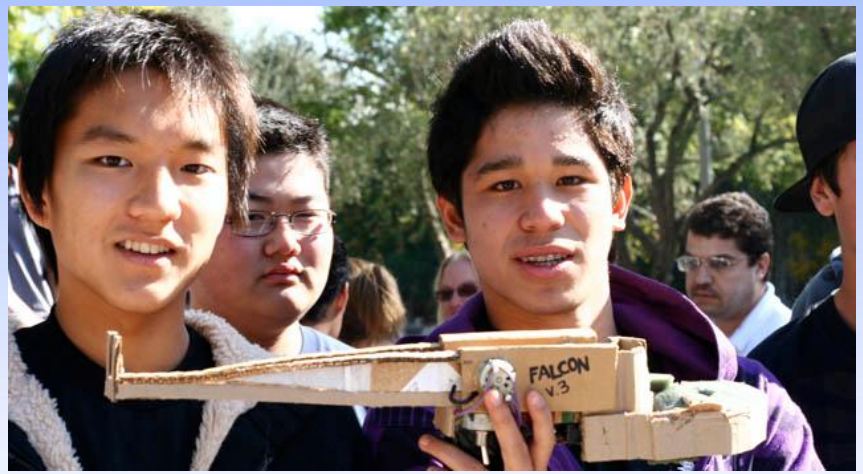
Special notes for IUSB teacher-researchers

In addition to the above guidelines, you must also file a form with the Institutional Review Board. Most classroom research will fit into the EXEMPT status, because it does not any risk to participants. Even so, you must document that status. You can find the correct forms at the Office for Research and Graduate Studies (Admin 247) or by clicking he can find instructions for filling out the form by clicking here. Plan about a week to get confirmation of your exempt status.

Credit: Mettal, G.

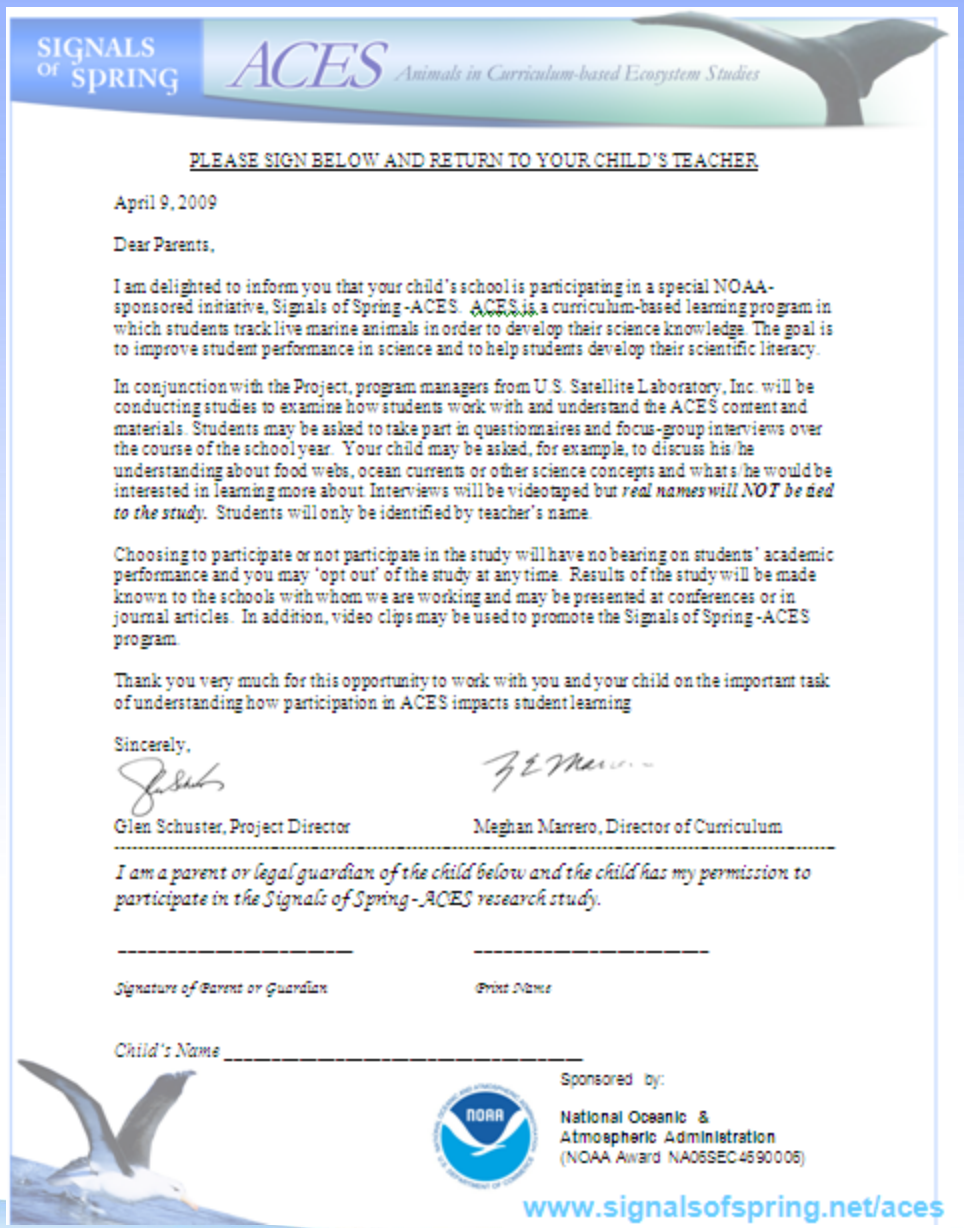
General Guidelines for Protecting Students

- Talk to your Administrator
- Voluntary Participation
- Informed Consent for Parents/Guardians
  - Include description & purpose of study
- Student Assent
- Assurance of Confidentiality
- Signatures of parent/guardian & date



Credit: NASA

Sample Consent Form



SIGNALS of SPRING ACES Animals in Curriculum-based Ecosystem Studies

PLEASE SIGN BELOW AND RETURN TO YOUR CHILD'S TEACHER

April 9, 2009

Dear Parents,

I am delighted to inform you that your child's school is participating in a special NOAA-sponsored initiative, Signals of Spring -ACES. ACES is a curriculum-based learning program in which students track live marine animals in order to develop their science knowledge. The goal is to improve student performance in science and to help students develop their scientific literacy.

In conjunction with the Project, program managers from U S. Satellite Laboratory, Inc. will be conducting studies to examine how students work with and understand the ACES content and materials. Students may be asked to take part in questionnaires and focus-group interviews over the course of the school year. Your child may be asked, for example, to discuss his/he understanding about food webs, ocean currents or other science concepts and what s/he would be interested in learning more about. Interviews will be videotaped but ***real names will NOT be tied to the study.*** Students will only be identified by teacher's name.

Choosing to participate or not participate in the study will have no bearing on students' academic performance and you may 'opt out' of the study at any time. Results of the study will be made known to the schools with whom we are working and may be presented at conferences or in journal articles. In addition, video clips may be used to promote the Signals of Spring -ACES program.

Thank you very much for this opportunity to work with you and your child on the important task of understanding how participation in ACES impacts student learning.

Sincerely,

Glen Schuster, Project Director — Meghan Marrero, Director of Curriculum

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I am a parent or legal guardian of the child below and the child has my permission to participate in the Signals of Spring - ACES research study.

_____ _____

Signature of Parent or Guardian *Print Name*

Child's Name _____

Sponsored by:

National Oceanic & Atmospheric Administration
(NOAA Award NA06SEC4690006)

www.signalsofspring.net/aces

Next Steps – Research Plan Draft

- Due September 30
- Overview and timeline of study
- Setting
- How data will be collected
- Triangulation and rigor for your study
- How will your analyze data?
- Use discussion board to ask colleagues for ideas and support

Final Poll Question

- Do you plan on publishing your study?

- Great job on the posts!

- Please remember to stick to the deadlines

Lingering questions or concerns?