

Name(s): Shannon Haines

Inquiry Lesson Sequence - Final Report

Your Students' Learning

How well did your students understand the observations, patterns, and explanations in your table and achieve your objectives? Describe at least one way in which they were successful and one way in which they were not completely successful. Provide evidence from student work to back up your claims.

Students were at first intrigued with the combinations that were being mixed and how they differed so greatly when the mixture itself was modified only slightly. Some got a bit frustrated because they had to modify their mixtures so often. They found it interesting that such simple solutions could be mixed together and form the compound that was so different. I feel that they understood well that the "compounds are formed by chemical reactions" (Explanation), but I don't feel confident that they can explain the fact that "Matter is made up of atoms. At least two atoms connected make up a molecule. Molecules share electrons. The chemical reaction that occurs is due to a reaction between electrons and the atoms of the substances combined."

Comment [AG1]: In some ways experiencing this frustration is good for their understanding of the nature of science.

A couple of groups of students did a wonderful job carefully modifying the amounts of what they were using based on the feedback that they were getting from the mixture itself, in terms of its texture. I feel that they were successful, not only because they were able to come up with a product similar to silly putty, which was the goal, but also because they were able to take their knowledge to other groups for support. They were not allowed to tell the other groups how much of each ingredient, but rather assist them in finding the correct combination. They were not allowed to use words that gave away concrete amounts in their counsel. I listened in as one student said the following to another group, "When you mixed $\frac{1}{4}$ cup of both water and glue, how did it look?...Then you put in the same amount of the Borax and what happened?...So what do you think would happen if you added the Borax a little bit at a time?"

Comment [AG2]: Good points. What is your evidence for this (what did students say or write that lets you know this)?

This showed me that she understood that it was okay to mix equal amounts of water and glue for a base, if you will, but that it was the Borax that was causing the mixture to stiffen, therefore it should have been added a bit at a time to reach the desired result. However, it was a bit of leading on her part, but that may have been what the group was in need of at this point, as they had been experimenting for a while and were becoming quite frustrated.

Comment [AG3]: Great – this peer teaching/ coaching is a great way for students to learn (and for you to learn what they know).

This second group was an example of one that was unsuccessful. In looking at their data collection, I noticed that they had repeated the same mixture numerous times, although at times in differing amounts. For example, attempt number 3 and seven were the same ratios (glue 3Tsp/1Tsp, water 4Tsp/2Tsp, borax 4Tsp/2Tsp) and I don't think they realized that it was just a smaller "version" of what they had already attempted, even though their outcome was similar. It could have been worded the same. I believe at the point where assistance was provided, they were in need of the guidance they were given.

Comment [AG4]: Okay. So, what does this tell you about their understanding of observations, patterns, or models?

Final Revisions and Reflections

Explain how you would teach this lesson sequence differently or change your goals the next time. Why would you make these changes?

I would definitely put more time into talking about polymers and chemical reactions before attempting this experiment. I feel that this class needed more of a lead in and much more background. I actually found a game online called "Spot the Polymer" (<http://www.science-house.org/CO2/activities/polymer/spot.html>) that I printed out and added to this for the next time I use it. I hope that it will give them a better understanding of what we are looking for.

The game talks first about recognizing polymers and calls a polymer "many units", which I think is a beneficial, understandable word for fifth graders. It has more meaning using words they know. The students then form a polymer with their bodies and think about how they can make themselves as a polymer stronger and stiffer. This may have given them a better understanding of what was happening when they mixed the ingredients together and why they were reacting the way they were.

As far as having them understand about the chemical reaction being a reaction between electrons and atoms may be something that is a bit too much for them at this age. It may be a better goal for older students. The understanding that there is a reaction that occurs and that it will differ depending upon the amount of substances involved would be a better goal for fifth grade.

Comment [AG5]: Good – the activity looks interesting. Remember that if you give them the explanation or model before they do the investigation, it is not really "inquiry" it is more "application" or applying a model to a phenomenon. This is not necessarily a bad thing (some topics are better taught through application). Do you think that this is one of those topics?

Comment [AG6]: Good points – it also engages students who learn better through visual or kinesthetic methods.

Comment [AG7]: Good points. Did you get them to where you wanted them to be (based on your learning goals)?

Continuing to Work with Students: Phases 4 and 5

How will you follow up on this lesson sequence, helping students to assess and extend their understanding, and to apply what they have learned in future units?

I will first leave this lesson sequence for a couple of weeks. After a couple of weeks, I will remind them of those few days we spent making Silly Putty and initiate a discussion of what happened. I will lead them with questions that cause them to think about why they were getting the reactions they were getting. I will also have them reflect again, as they did when they shared, about what they learned and how they gained their knowledge, whether from repeated experimentation or from outside help. I hope that by having this discussion aloud, all students will learn from the efforts of others.

I will then tell them that we are going to do another experiment with polymers. I will start out with the "Spot the Polymer" game which leads into them building their own polymer. We will have many out loud discussions along the way with a lot of feedback from not only me but other students. We will end this time with the polymer mixture to create Slime. I will first have them recall the reactions they had when creating Silly Putty and using that information, make a "good guess" about what they will need for Slime. We will have a class discussion about this before they are sent into their groups to work through this.

I think that slowing things down and talking about them more will help the students, not only in this investigation, but in all areas. I sometimes get so wrapped up in "what" I need to get done, that the "how" of it gets pushed to the back burner and the students don't gain the knowledge they are capable of. There is too much emphasis on we have to do this, and then this, and then this, and when the other teachers in the same grade level have moved on to the next unit and I'm still on the last one, I feel like I'm not doing as well. I need to learn to lose that attitude and focus instead on student understanding and learning as my goal.

Comment [AG8]: Okay. What learning target or goal does this help you to achieve?

Comment [AG9]: This sounds like a good method for scaffolding.

Comment [AG10]: Very good points here. Not forgetting the hows and whys is so important!

Turning in and Sharing the Assignment

You should BOTH turn in your plan to the dropbox AND share it with other members of your team. When you turn in the plan to the dropbox, add your last name to the beginning of the file name. So an assignment that I turned in would be named GotwalsLessonSequence.doc, for example.

Scoring Rubric: Total points = /200

Note that grades will be based on *how good this lesson sequence would be the next time you teach it*. Some things don't work when you're trying something new. That's OK, as long as you can explain how you have learned from the experience and how you will make changes for next time.

Component	Points	Comments
Clarifying goals: EPE table (20 points)		
Clarifying goals: Objectives (20 points)		
Plans and teaching Phase 1: Establishing problem (20 points)		
Plans and teaching Phase 2: Observation and data collection (20 points)		
Plans and teaching Phase 3: Finding and explaining patterns in data (20 points)		
Final report: Students' learning (35 points)	31	
Final report: Revisions and reflection (35 points)	33	
Final report: Phases 4 and 5 (30 points)	34	

Final Report: 93/100