Reflective Teaching Assignment #1

Part 1a: Lesson Plan Analysis

Criterion 1: Classroom Management

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- **How will students get materials?**
  The lesson plan lists the needed materials but does not explain how materials will be distributed. Because the classroom space is limited and the number of students is quite large, the teacher will distribute the materials to groups as students work on predicting. Many adult helpers will be present during the time of instruction, so they can help distribute materials to pairs and groups of threes.
- **How will the teacher call the class back together while students are working in pairs?**
  The lesson plan omits how the teacher should transition between whole-class and small group learning. This is a transition that occurs frequently in science classrooms! To best facilitate this transition, I would use musical instruments to get the students attention. These instruments (bells, horns, squeaky toys, songs, etc.) are easily heard above student chatter and do not require the teacher to yell. (My students already know that these instruments are used to get their attention and respond almost immediately.)
- **How will students be monitored?**
  The lesson plan does not mention how students will be monitored in their groups. It is important for the teacher to walk around the classroom and observe groups as they work. Proximity is a wonderful tool for keeping students on task! Also, the other adult helpers in the room will monitor students and their work, helping to keep the students on task and the pepper off the floor.

Criterion 2: Establishing a Sense of Purpose

Students must understand *why* they are performing the demonstrations included in the lesson. This will make the work more relevant to their lives, interesting, and engaging.

- **Does the lesson help teachers make the purpose of the activity explicit to students?**
  The lesson does a nice job of explaining to the students that they are conducting demonstrations to learn about what causes a lightning strike. I would further explain that the students are learning about static electricity in preparation for a follow-up lesson about electricity in the weather. The students should be looking forward to the next lesson!
- **Is the purpose meaningful to students and anchored in the lives of learners?**
  The subject of static electricity is meaningful to students because students encounter this phenomena on a daily basis in the forms of shocks from the McDonald's Playland slides, the wrappers of their juice box straws "sticking" to their hands, and many others. The purpose given in the lesson plan (learning information to later explain the occurrence of electricity in weather) directly relates to their personal experiences with thunderstorms. The subject of lightning is anchored in students' lives and is interesting to students because it is a powerful force in nature. Learning about what causes the large and

dangerous flashes of lightning they see during thunderstorms will be "cool" and engaging.

- **Does the lesson help the teacher connect the purpose of the activity to what students have been learning about thus far in class?**
  The lesson plan says to review with students what they know about cloud formation, thunder, and lightning storms. This connects the purpose of the activities to a unit on weather. However, my students are learning about magnetism, not weather, and are transitioning into learning about electricity. I would connect the activities to the force of attraction between two objects students have observed when playing with magnets, especially the knowledge that like charges repel and opposite charges attract. This would connect the lesson to what students have been studying in their electricity and magnetism unit.

Criterion 3: Eliciting Students´ Ideas at the Beginning of a Lesson
Understanding what students know at the beginning of the lesson is necessary so the teacher can adapt the lesson during instruction and essential when assessing what students learned.

- **At the beginning of the lesson, does the lesson enable the teacher to elicit students´ ideas about the new content and predictions about the phenomena?**
  The lesson plan does not enable the teacher to elicit students' ideas at the beginning of the lesson but jumps right into the demonstrations. I would alter the lesson to include a point where students are asked to predict what will happen in the demonstration. By recording their predictions in words and/or pictures, students and teachers will be able to observe a record of what they knew before the lesson and use the records to judge the extent of learning that occurred during the lesson.
- **Does the lesson ask students to give explanations for their ideas and predictions in order to help teachers probe beneath students´ response?**
  The lesson plan does not ask for explanations for ideas and predictions uncovered before the lesson because it does not elicit student ideas! On my prediction worksheet that students are to fill out before performing the demonstration, I would include a "Why?" question to get students to explain their predictions. I would also announce to the class as they write their predictions that I want them to explain why they predicted as they did.
- **Does the lesson provide opportunities for students´ ideas and predictions to be recorded and shared with others in the class?**
  The lesson plan also fails to have students record and share their predictions. I would ask students to record their predictions and explanations for their predictions on the prediction worksheets. I would then have students share their predictions in pairs or threes before they explore their particular demonstration.

Part 1b: Revised Lesson Plan

Title of Lesson: Pepper, Spoons, and Static Electricity
Grade Level: 5th
Length of Lesson: 45 minutes

Overview

Students will explore what happens when they run a plastic spoon through their hair and hold it above ground pepper sprinkled on the table. Individuals will predict what will happen in the demonstration and share their predictions in pairs or groups of three. Pairs/threes will then perform the demonstration and hypothesize why the spoon picked up the pepper. The class will watch a short video about static electricity and the teacher will demonstrate how to draw a diagram of the phenomena in the video. Individual students will then draw diagrams of and explain the demonstration they explored.

Learning Goals

At the end of the lesson, students will be able to…

- Understand that items become negatively charged when they pick up additional electrons.
- Explain that static electricity is an electrical current produced by the attraction of two oppositely charged items.
- Predict what will happen in the demonstration, record observations, and hypothesize about what caused the results.

Connections to Standards/Benchmarks/Curriculum

- The main notion to convey here is that forces can act at a distance. Students should carry out investigations to become familiar with the pushes and pulls of magnets and static electricity… By the end of 5th grade, students should know that: Without touching them, material that has been electrically charged pulls on all other materials and may either push or pull other charged materials. *[AAAS: The Physical Setting – Forces of Nature (3-5). Source: http://www.project2061.org/tools/benchol/bolframe.htm]*
- Develop solutions to problems through reasoning, observation, and investigation. *[Michigan Curriculum Framework (Science) I.1.e.2. Source: http://www.michigan.gov/documents/MichiganCurriculumFramework_8172_7.pdf]*
- Show how science concepts can be illustrated through creative expression such as language arts and fine arts. *[Michigan Curriculum Framework (Science) II.1.e.2. Source: http://www.michigan.gov/documents/MichiganCurriculumFramework_8172_7.pdf]*

Context of Lesson

This lesson is part of a unit on electricity and magnetism. Students have been working with magnets and the forces produced by magnets and are transitioning into electricity. This lesson is in preparation of a lesson on electricity in the weather, namely the causes and formation of lightning.

Materials

- Instructions and Prediction handouts (one per student)
- Scrap paper (to spread pepper on)

- Ground pepper
- Plastic spoons (one per two students)

Students' Ideas
Before the lesson, students should understand…
- Magnets can pull and push objects without touching them.
- Electricity is a type of force.

Potential alternative ideas:
- Objects become positively charged because they have gained protons (CASES – Children's Ideas in Science).
- Objects become positively charged because their electrons have been destroyed (CASES – Children's Ideas in Science).
- Static electricity is the buildup of electrons (CASES Unit – Electricity/Magnetism).
- Energy is associated only with humans or movement, is a fuel-like quantity that is used up, or is something that makes things happen and is expended in the process (AAAS).
- Associate energy only with living things, in particular with growing, fitness, exercise, and food (AAAS).

Teaching Strategies: Introduction
- Connect this lesson to previous lessons on magnetism by reviewing that forces can act at a distance, that is, a magnet does not need to *touch* another object to push or pull the object. The same is true for electrical charges. We will be investigating and observing the electrical currents produced by static electricity in order to help us understand electricity in the weather next week.

- Investigation question: Why does a plastic spoon pick up pepper off the table?

- Additional adult helpers will be present in the classroom and will help distribute materials needed for the demonstration.

- Each student will be given a directions and prediction handout for the demonstration. As individuals, students will read the directions and predict what will happen in the demonstration. Students will draw or write their predictions and write short explanations for the reasoning behind their predictions.

- Students will then share their predictions in pairs or threes.

Teaching Strategies: Main Lesson
- After predicting, pairs/threes will be given the materials needed to perform the demonstration and will follow the instructions on the handout. The adult helper at each table will assist and monitor students. The teacher will walk around to each of the groups and observe their work, ask questions, and maintain on-task behavior.

  Demonstration:
  - Spread a *small amount* of ground pepper on a piece of paper.
  - Vigorously run the plastic spoon through your hair. Only *one* person should do this!

  - Hold the plastic spoon about one inch over the pepper.
  - Record your observations on the back of this sheet.

- After exploring what happens in the demonstration, pairs/threes should hypothesize *why* they observed what they did. What caused the pepper to be attracted to and stick to the spoon? As students are hypothesizing, collect materials to limit distractions during the rest of the lesson.

Teaching Strategies: Wrap-Up

- The teacher should now call the class together using a musical instrument. Show the PBS *Zoom* video about static electricity, "Static Electricity: Snap, Crackle, Jump." Video length: 2 minutes, 49 seconds.
  (Source: http://www.teachersdomain.org/resources/phy03/sci/phys/mfe/zsnap/index.html)

- Model how to draw a diagram of the record and cereal experiment. Include pictures of the record, wool, and cereal before, during, and after rubbing the record with wool.

- Individuals should then draw a diagram of their demonstration and explain "the science behind the phenomena." Share diagrams and explanations in pairs/threes. Teacher should circulate as students work and choose a well-constructed diagram and explanation to showcase at the end of the lesson.

- Showcase the chosen diagram and explanation. Have the student share his/her work with the entire class. The diagram and explanation should directly relate to the initial investigation question.

- Explain that static electricity is the force that attracts the pepper to the spoon. Ask students to look for other ways they experience static electricity during the week and hint that they often experience static electricity in the weather. They will learn about the formation of lightning the following week.

Assessment

- Collect student worksheets. Individuals should have predicted, recorded observations, hypothesized, and created a diagram of the phenomena they explored.

Part 1c: Lesson Plan Rationale

I. Use of Science Curriculum Materials

1. Which of the following best characterizes how you started planning for this lesson?
__ I had a general idea of the topic I wanted to cover but no materials yet.
__ I had an idea for a student activity or investigation and built a lesson around that.
__ I had an existing lesson plan that I planned on using.
__ Other

2. How explicit was your learning goal before you started developing your lesson?
__ Very explicit (I knew specifically what I wanted students to learn and how they would demonstrate their understanding.)
__ Somewhat explicit (I knew specifically what I wanted students to learn.)
__ Not very explicit (I had identified specific parts of a scientific concept I wanted my lesson to address but wasn't sure about exactly what I wanted students to learn.)
__ I really didn't have a learning goal at first (I had a general sense of what scientific concept(s) I wanted my lesson to address but wasn't sure exactly what I wanted students to learn.)

3. What existing lesson plans, curriculum materials, and other resources did you use to develop your lesson? Please list them here.

	Name/Title	Type of Resource	Source	Additional Information
	Take Me To Your Liter	*Existing lesson plan*	*My CT and/or placement classroom*	*From FOSS science curriculum*
1.	"Stormy Weather"	Existing lesson plan	Internet/Online	DiscoverySchool.com
2.	"Static Electricity: Snap, Crackle, and Jump"	Video/DVD	Internet/Online	www.teachersdomain.org PBS *Zoom* video clip
3.	"How Van de Graaff Generators Work"	Content Resource	Internet/Online	science.howstuffworks.com

a. What did you like about features of the curriculum materials you used? What didn't you like? Why?

I liked the demonstrations included in the lesson. The demonstrations are hands-on activities students can use to observe static electricity. They require few materials and the materials needed are easily accessible and inexpensive.

I liked the explicit objectives stated in the lesson. This helped me to understand what is most important to understand about lightning and static electricity.

I did not like that the lesson targeted middle school students. I needed to adapt much of the lesson to make it appropriate for my fifth graders. They needed explicit instruction about static electricity before we could even begin to explain how lightning occurs during a thunderstorm.

I did not like that two of the demonstrations did not work! Both Laura and I tried to get Demonstrations #2 and #3 to create sparks, but failed. We then needed to rework the entire lesson so that all students would be asked to try a demonstration that would produce results.

b. Were they good choices for developing an inquiry-oriented lesson? Why or why not?

This initial lesson plan was a good choice for developing an inquiry-oriented lesson because it was centered on student demonstrations and explorations. It also asks students to explain what they observed in their demonstrations. I simply needed to simplify the lesson and take these inquiry ideas a step farther to make it a great inquiry-oriented lesson for my class.

The video was an excellent choice to use in my inquiry-oriented lesson. I could use the video demonstration as a model and draw a diagram of what happened. I could also refer to and expound upon the explanation given in the video. Then, I could ask the students to draw a similar diagram for the demonstration they performed.

c. What other factors did you have to consider in using these resources?

The lesson plan did not offer a concise definition or explanation of static electricity. I had to look up an explanation in other resources, namely the "How Van de Graaff Generators Work" article. I needed to do outside research to supplement the material in the lesson plan.

II. Adapting Science Curriculum Materials

4. Please think about **each of the changes you made** to your lesson. List each one and briefly describe it. Then, **for each change** you made, please answer the following:

a. How did this change **improve upon** what was already in the existing lesson?
b. Did this change make your lesson **more or less inquiry-oriented**? If so, how?
c. What **other factors** did you consider in making this change?

- I divided the lesson into two distinct lessons—one about static electricity and the other about static electricity in the weather (lightning).
    a. This improved the initial lesson plan because it made the material more accessible to my fifth grade students. The lesson targeted middle school students and my fifth graders did not have the background knowledge needed to use the lesson as written. I first needed to teach the students about static electricity and give them the scientific language necessary to explain how static electricity occurs.
    b. This did not alter the level of inquiry in the lessons but rather separated the lesson into two smaller chunks.
    c. Time was another factor considered in this change. Forty-five minutes of the school day is devoted to science three days a week and I knew I could not properly teach about static electricity and teach about lightning in this amount of time. We needed to spend additional time learning about static electricity than was written into the initial lesson plan.

- I had the class do *one* demonstration in pairs instead of having four groups do four different demonstrations.
    a. This change ensured that students would get to experience and observe static electricity (the sparking demonstrations did not spark!). It also made the classroom more manageable for me as the teacher, especially since my fifth graders are much younger than middle school students!
    b. Guaranteeing that the chosen demonstration would work made the lesson more inquiry-oriented because it gave *all* students the chance to investigate static electricity.
    c. I also considered the issue of classroom management when making this decision. I was able to cut the demonstrations that required dark spaces and so cut my liability when sending small groups of fifth grade students to dark corners of the room! By having all of the students do the same demonstration, I was also able to keep them all focused on the same project and give directions to the class as a whole. I did not have to be four different places at once.

- I added an investigation question: "Why does the plastic spoon pick up pepper off the table?"
    a. This gave the demonstration direction. Students were to try to figure out why they got the results that they did.
    b. This made the lesson more inquiry-oriented, as the lesson plan simply said the teacher should explain why the experiments happened as they did. The students were not required to figure things out on their own. My question motivated and required students to use their own brains to hypothesize the answer to the investigation question.
    c. What did I want students to explore in the lesson?

- I created a worksheet for students to use during the lesson. This included instructions for the demonstration and boxes for predictions (and explanations), observations, hypotheses, and explanations of the science behind the phenomena.
    a. This improved the initial lesson because it led students through the scientific process of figuring out *why* things work as they do. Scientists predict, record observations, hypothesize, and research.
    b. This made the lesson more inquiry-oriented because it helped the students focus on and follow the scientific process.
    c. The worksheet also helped students stay organized and gave them a place to write down their ideas (they do not have science notebooks). I could then keep their worksheets as evidence of my lesson to reflect on!

- I added predicting and hypothesizing to the lesson and gave the students time to share their ideas with others before completing the experiment.
    a. This improved the lesson because it was one way to elicit student ideas and explanations for phenomena before I taught the science behind the concept of static electricity.

b. This made the lesson more inquiry-oriented because it allowed students to communicate and justify their ideas with others and then evaluate their predictions and hypotheses with the information I provided.
c. None.

- I added a short video to the lesson that showed another static electricity demonstration and explained the science behind the results.
  a. This improved the lesson because it engaged the students in the science of static electricity in a way I could not have done by lecturing. It was another way to explain static electricity that may have helped some students in the class, especially the visual learners.
  b. It made the lesson more inquiry-oriented because it provided students with information that they needed to apply to their own experiment. Students were given the information they needed to work with but were asked to draw conclusions on their own about their demonstration.
  c. I also considered the gradual release of responsibility model. I thought it important to show students what kind of diagram and explanation I expected of them without telling them the answer to their investigation question. I used the video as a way to talk about a static electricity demonstration without giving the students the exact words they needed to explain their own demonstration.

- I changed the assessment from writing a paragraph to simply turning in the worksheet on which the students recorded their ideas and explanations.
  a. This improved the lesson because it made the activity more age-appropriate.
  b. It did not make the lesson any more or less inquiry-oriented.
  c. I solely considered the targeted age group and student abilities when making this decision. These students were not capable of performing on the assessment given in the initial lesson plan.

5. How inquiry-oriented do you think your lesson is?

__ Very inquiry-oriented	__ Not very inquiry-oriented
__ Somewhat inquiry-oriented	__ Not at all inquiry-oriented

Please explain your answer to question #5. Why do you think your lesson was or wasn't inquiry-oriented?

Although largely teacher-directed, my lesson was very inquiry-oriented. I provided my students a scientific question to explore and the materials, evidence, and language to construct explanations of the science behind what they observed. Students were asked to predict, record observations, hypothesize, and explain the science of static electricity. They were also asked to share these ideas in writing and verbally with their classmates. A key component of this sharing was justifying their explanations.

6. Please include any other comments you have about your lesson.

   I completely revamped the initial lesson plan to fit with the unit my students are studying. As a result, the learning goals, connections to standards/benchmarks/curriculum, context, and assessment are all different from the initial lesson plan. These changes were made so the lesson would be appropriate for fifth grade students and would guide them through scientific discovery and explanation.