Appendix A: Description of the Science Lesson that was the Basis for the Reflection

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| Brief Description of Lesson Component | Additional Detail | \*Goals for this aspect of the Lesson |
| Guiding Question: What happens to the temperature of sand and water when heat is applied? |  |  |
| PSTs set up heat lamps with small containers of water and sand underneath and record the temperature in each in one minute increments for 12 minutes. | As we considered how to design an investigation to answer our guiding question, we discussed the notion of a fair test and how we might conduct one to answer this question. Once we agreed on a testing procedure, we engaged in a whole class discussion of how to set up an appropriate data table to record our findings. After giving directions, I released the PSTs to gather their materials and begin collecting data. As they worked, I moved around the room asking and answering questions and trouble-shooting if groups ran into difficulties. | Explore: Provide opportunities for students to explore through all appropriate senses and to be fully involved. Encourage group cooperation during investigations, encourage questions. Should use several of the science process skills. |
| Transition to Explain | As people began to finish with data collection, I asked one group to come up to our class document camera and record their results for the entire class to see so that we could use them in our discussion of the findings.  Other groups answered questions that I had written on the board in which they had to think about the data that they had collected and what it meant. |  |
| Explain: Discussion of data collected and introduction of key science concepts and vocabulary. | We had a whole class discussion of the patterns we noticed from the data. Each group determined whether their results showed similar patterns of a greater temperature change in the sand and a smaller temperature change in the water. When one group did not get those expected results, we discussed what might have happened to cause them to get results that were different from everyone else in class. During the discussion I introduced the terms radiation and conduction and we applied them to our experience in the “Explore” and a hot day at the beach. | Explain: Interact with students to discover their ideas. Question to cause them to reflect. Help them use ideas formed from exploration to “construct” concepts and meaning sensible to them. Use evidence from their experiences in the “explore” to support their understanding. This is the time to introduce formal vocabulary to make sense of what they have seen and connect science concepts to real-life applications. This occurs through both small group and whole class discussion supported by the teacher. |

\*The goals included in this column come from a class handout developed along with my colleagues that we share with students to describe 5E lessons.

Appendix B: Template to Guide Discussion during the Explore and Explain Reflection

**Science 5E Reflection Assignment: Explore Section**

For this assignment, you will reflect on some of the teaching that has occurred in this class using a 5E approach to science teaching. **In class**, we will watch short portions of the video as a class and discuss the actions of the teachers and the students. The purpose of this assignment is for you to use the understandings about science teaching that you develop through this group reflection to inform your own planning and teaching of your 5E Lesson. After we watch selections from the videos, we will discuss them as a class. **After class**, you will use the notes that you took during the discussion to reflect on what you learned about science teaching from the exercise.

**You will turn in:**

* Your data collection sheet with notes typed on it
* A reflection summarizing what you learned from the experience

**Data Collection Sheet:**

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| --- | --- | --- |
| **Time Stamp on Video/ Brief Description of What’s Happening** | **Notes/Comments/Quotations from Teacher and Students** | **Your Thoughts about this excerpt from a Pedagogical Perspective** |
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**Questions for Reflection for the Explore:**

For the reflection, you will answer the following questions **using specific examples** from the video:

1. Which actions by the teacher seemed to support student engagement and understanding?
2. What management strategies did the teacher put in place in this lesson? How did they impact the flow of the lesson and student learning?
3. What additional management strategies could have been used by the teacher to improve the use of time in the lesson, or improve student engagement and understanding?
4. What did you notice about the manner in which the teacher provided directions and scaffolded/modeled what students should be doing during the lesson?
5. What changes might the teacher have made to facilitate additional student learning?
6. What overall lessons about science teaching are you taking from this experience?

**Questions for Reflection for the Explain:**

For the reflection, you will answer the following questions **using specific examples** from the video:

1. Which actions by the teacher seemed to support student engagement and understanding?
2. What management strategies did the teacher put in place in this lesson? How did they impact the flow of the lesson and student learning? What additional management strategies could have been used by the teacher to improve the use of time in the lesson, or improve student engagement and understanding?
3. What aspects of the way that the teacher conducted the “explain” portion of the lesson seemed to support student learning? What was the role of questioning during the “explain?”
4. Did the students seem to understand/not understand the key content ideas in the lesson? How do you know?
5. What changes might the teacher have made to facilitate additional student learning?
6. What overall lessons about science teaching are you taking from this experience?

Appendix C: Example Excerpt from Student Template

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| Time Stamp on Video/ Brief Description | Notes/Comments/Quotations from Teacher and Students | Your Thoughts about this excerpt from a Pedagogical Perspective |
| 2:20-2:50 🡪 directions  3:00-3:15🡪 explaining what we will be doing for the explore | * Asked us to repeat directions * Asked a lot of questions about what was happening, but no yes or no questions | * Students need a lot of repetition with directions * Do not assume that they automatically understand |
| 10:45-15:00🡪 directions for setting up experiments  \* From 2:20-15:00= Set-Up and Directions for activity in explore | * Ask questions instead of just telling us what to, receive student input * Have Students Repeat Directions!!!!!! * \* Note for future, maybe have experiment set up prior to starting, but still have discussion about why they are setting up activity this way to enhance cognitive demand | * Important that as the teacher you know what you want the students to know without just telling us the answer * Important to have productive questions * \* For future, or with children, having written and verbal directions would be helpful |
| 34:30- end🡪 finishing results, some students are finished | * MY GROUP IS SO OFF TOPIC… * We finished early, and are completely off topic from science class at all * \* Ending directions must be as clear as beginning directions | * Teacher was writing on board to prepare for the discussion, with her back turned to the class. * Areas for suggestion: have data table ready (as suggested earlier), create data table on computer so that you can still see the class |

Appendix D: Rubric for Reflection Assignment

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| **Criteria** | **Exceeds**  **Expectations** | **Meets Expectations** | **Does not Meet**  **Expectation** | **Points Earned** | **Comments** |
| Detailed notes included on the data collection sheet | Detailed notes including time stamps are included in the template. The reader can get a clear picture of what is happening in the lesson from the notes. Thoughtful and reflective insights related to pedagogical perspective are included. | Detailed notes are included in the template. Multiple direct quotations are included. The reader can get a picture of what was happening in the lesson from the notes included. Surface level insights related to pedagogical perspective are included. | Minimal detail is included in the template.  What is provided does not provide a sense of what was occurring in the clip or your interpretation from a teacher perspective. |  |  |
| Thoughtful reflections to each of the questions included in the questions for reflection. Specific data from data collection sheet used to support your answers to the questions. | For each of the 6 guiding questions there is a thoughtful reflection included that is directly linked to examples from the template. Two or more aspects for success and suggestions for change are included for each question. | For each of the 6 guiding questions there is a thoughtful reflection included that is directly linked to examples from the template. At least one key aspect for success or one suggested change is included for each question | There is not a thoughtful reflection included in response to each of the six guiding questions. Superficial suggestions are included. The aspects for success and suggestions for change are not linked to examples included in the template. |  |  |
| Spelling and Grammar | No spelling or grammar errors are included in the document. | One-two spelling or grammar errors are found in the document. | More than 2 spelling or grammar errors are found in the document. |  |  |
| Total |  |  |  |  |  |