Planning for Effective Science Instruction

Component II of the Science Classroom Observation Protocol: Science Content is Intellectually Engaging

Name: Mark Emmet

Curriculum Title: FOSS Variables Grade Level: 5

Target Lesson: Investigation #1 – Swingers

CTS Study Guide: Controlling Variables Page: 231

Element A: Science content is significant, accurate, and worthwhile	
Indicators: ☐**Science content is explicit and apparent to students.** ☐**Science content is primarily focused on big ideas supported by relevant concepts, facts, and terms.** ☐**Science content is within the bounds of an agreed upon body of knowledge.** ☐**Science content is accurate.** ☐**Science content is developmentally appropriate and scaffolded appropriately.** ☐**Science is portrayed as a dynamic body of knowledge that changes based on the best available evidence.**	Drawing upon the indicators for this element of effective instruction (left-hand column) and what you learned from Section III of your CTS Summary, **identify a specific point in the lesson** where you can make the science content "**explicit and apparent to students."** *The FOSS Variables curriculum does not focus on deepening student understanding of scientific 'big ideas' as related to scientific content. It does focus on the nature of science and scientific processes. The focus on scientific processes, specifically the control of variables in an investigation, is developmentally appropriate at the fifth grade level.* *I have chosen Investigation 1,'Exploring Swingers', Part 2, 'Testing Variables,' step 7, 'Test the Variable of Length,' to make the science content explicit and apparent to students. I'll also want to periodically check in with students to assure they are aware that we are focusing our attention on the control of variables in investigations throughout the Unit.* Based upon your experiences in the Content Immersion**, brainstorm strategies** you could use to make the science content "**explicit and apparent to students."** *I would make explicit connections between the previous experiments in Investigation 1, Part 2 that we have conducted. (At this point we have investigated three variables: release position of the pendulum; mass of the bob; and length of the string).* *I would ask reflection prompts such as: What have we done in each of the previous experiments? Have we changed one or more than one variable at a time? Why is this important?* *I could have students white-board their responses and discuss them.*

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Element B: Science content builds on students' prior ideas or experiences.	
Indicators: ☐ **Students reveal their preconceptions about the science content, the underlying related concepts, or the nature of science.** ☐ **Students reveal their underlying thinking and reasoning and the source of their preconceptions.** ☐ **Students recognize links between their preconceptions or previously learned science concepts and the activities or experiences in the science lesson.**	Drawing upon the indicators for this element of effective instruction (left-hand column) and what you learned from Section IV of your CTS Summary, **identify a specific point in the lesson** where you can create an opportunity for students to **"reveal their preconceptions about the science content."** *I would choose the very beginning of the Unit, the first investigation, 'Exploring Swingers' as a place for an opportunity for students to reveal their preconceptions about the science content.* Based upon your experiences in the Content Immersion**, brainstorm strategies** you could use to allow students to **"reveal their preconceptions about the science content."** *I could use a combination of a pre-assessment and white boards to see what students thought initially about the control of variables. I would use a prompt such as "Does it mater if I change more than one variable at a time in an investigation?" I think I would probably need to create an example similar to the end of the unit assessment, 'End of Module Assessment for Variables', so students would not have to think about the prompt in the abstract. I would want to have students discuss their ideas and I would want to display their initial thoughts publically. As we progress through the Unit I would want to return to their initial ideas and compare their initial state of thinking with their current state.*
Element C: Science content is intentionally connected to the classroom activities and experiences.	
Indicators: ☐ **Student actions and interactions focus on understanding important and relevant science content.** ☐ **Students generate and explore questions about the science in the lesson.** ☐ **Students can articulate the intended science content of a lesson, activity, or experience.**	Drawing upon the indicators for this element of effective instruction (left-hand column) and what you learned from Section II and IV of your CTS Summary, **identify a specific point in the lesson** where you can create an opportunity for students to **"articulate the intended science content within the lesson, activity, or experience."** *I have chosen Investigation 1,'Exploring Swingers', Part 2, 'Testing Variables,' step 11, 'Extract the Relationship From the Data,' to create an opportunity for students to articulate the intended science content within the lesson, activity, or experience.* Based upon your experiences in the Content Immersion**, brainstorm strategies** you could use to allow students to **"articulate the intended science content within the lesson, activity, or experience."** *I would ask students to look back at the three variables we have tested in this lesson and ask them to make observations about our explorations of variables. I would ask questions such as: What have you noticed? What patterns do you see in our investigations? Can you describe your ability to draw conclusions from an investigation when you do or do not control variables? Students at this point are asked to make sense of the relationship between the length of the pendulum and the number of swings the pendulum makes in 15 seconds. The questions listed above are intended to help them understand the intended science content of all experiments as they relate to control of variables.*