



1. **NGSS Lab** OEL-refined Lessons

Teaching for Conceptual Change

Date:       School:       Grade:

Unit:       Lesson #s

Concepts:

STEM Professional:

Purpose of the revision:

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| Lesson refinements to observe  **Effective Science Instruction**:   * Elicit students’ initial ideas * Engage students intellectually with important science content * Provide opportunities for students to confront their ideas with evidence * Help students formulate new ideas based on that evidence * Encourage students to reflect upon how their ideas have evolved | Lesson refinements to observe selected **Student Learning Traits**:   1. All students engage intellectually in   important science content.   1. All students participate in   science discourse with peers  (equitable, accountable talk).   1. All students use evidence to demonstrate conceptual understanding. |

**2. Concept Development**

**Essential Question**

**Learning target**

**Success criteria**

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| Lesson context (lesson block in the unit)  **Monday**  **Tuesday**  **Wednesday**  **Thursday**  **Friday** |
| **Science Content Study notes for the lesson** |

**Standards** (*Include both Washington State and NGSS as appropriate)***:**

**3. Teaching for Conceptual Change** *Revised lesson plan*

**Day**       **Observation day** yes no

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| **Elicit each student’s initial ideas.** | |
| *Find out all the ideas in a class, from earlier science courses and everyday experiences:*   * *focus question* * *public record of the ideas* * *more…* | |
| Student Thinking  *What type of thinking will students be doing during this time?* | Instruction and Assessment  *What will the students be doing? The teacher?*  *What is being assessed? How is it being assessed?* |

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| *Student thinking:*    *Anticipated responses:* | **1. X min 1’s Pre-Assessment of Ideas and Reasoning**  Record your prior knowledge and reasoning about:   * ***x***   **2. X min class Public Record**  Public Record display of whole class’ ideas and reasoning |

**Day**       **Observation day** yes no

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| **Prompt possible dissatisfaction with old ideas and surface the range of students’ new ideas that make sense with their new observations.** | |
| *Run investigation as designed with instruction moves to support students, such as:*   * *List class’ range of ideas*   + *strengthen those that make sense with new observations and evidence*   + *cross off those that do not fit observations and evidence* * *Record students’ possible dissatisfaction with their original idea – cross items off the public record, when evidence no longer supports an idea* * *Record students’ ideas that are gaining confidence -- highlight items on the public record when evidence adds support to an idea* * *Ask questions to assess and guide learning along the way* * *More…* | |
| Student Thinking  *What type of thinking will students be doing during this time?* | Instruction and Assessment  *What will the students be doing? The teacher?*  *What is being assessed? How is it being assessed?* |

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| *Student thinking:*    *Anticipated responses:* | 1. **x min 2’s x .**   x  x   1. **x min 2’s A/B discourse protocol**   Stop and Think about…   * ***x***   **A** and **B** separately write their own ideas that answers the essential question of the lesson.  30 sec **A** tells **B** their idea/reasoning,  **B** listens to be able to respond  15 sec **B** restates **A**’s key point    30 sec **B** tells **A** their idea/reasoning,  **A** listens to be able to respond  15 sec **A** restates **B**’s key point |

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| **Day**       **Observation day** yes |
| **Narrow the range down to the one new idea, that is most plausible in this situation.** |
| * *Sense making session to find the simplest working model to explain all the current observations and evidence.* * *Resolve new science understanding via:* * *think alone* * *diagram the model* * *write scientific explanation* * *make a public presentation* * *More…* |

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| Student Thinking  *What type of thinking will students be doing during this time?* | Instruction and Assessment  *What will the students be doing? The teacher?*  *What is being assessed? How is it being assessed?* |

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| *Anticipated responses:*  *Students who are not understanding the concept*    *Students who are developing the concept (partial or fragile understanding)*    *Students who understand and are applying the concept* | 1. **x min 2’s x .**   x  x |

**Day**       **Observation day** yes no

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| **Reflect back to initial ideas on how students’ conceptual understanding has changed.** | |
| *Reflective writing prompts to track progress towards and build confidence about the learning target.*   * *“Stop and think about our learning target … “* * *Write about your science learning using these sentence starters:*   + *“ I used to think… but now I know… because I have evidence…”*   + *“ I still wonder...”* * *More…* | |
| Student Thinking  *What type of thinking will students be doing during this time?* | Instruction and Assessment  *What will the students be doing? The teacher?*  *What is being assessed? How is it being assessed?* |

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| *Anticipated responses:*  *Students who are not understanding the concept*    *Students who are developing the concept (partial or fragile understanding)*    *Students who understand and are applying the concept* | 1. **x min Reflective Writing**  * ***“Stop and think about our learning target … “*** * ***Write about your science learning using these sentence starters:***   ***“ I used to think… but now I know… because I have evidence…”***  ***“ I still wonder...”*** |

**Day**       **Observation day** yes no

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| **Apply the new idea to test how it holds up in new situations.** | |
| * *Prompt to record how the class idea-working working model -- holds up, or whether it still needs more information and refinement.* * *Application to compare own working model, or idea, with another test situation.* * *More…* | |
| Student Thinking  *What type of thinking will students be doing during this time?* | Instruction and Assessment  *What will the students be doing? The teacher?*  *What is being assessed? How is it being assessed?* |

|  |  |
| --- | --- |
| *Anticipated responses:*  *Students who are not understanding the concept*    *Students who are developing the concept (partial or fragile understanding)*    *Students who understand and are applying the concept* | 1. **x min x**   ***x*** |

**4. Observations: collecting the evidence of learning**

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| **Effective Science Instruction**:   * *Elicit* students’ initial ideas * *Engage* students intellectually with important science content * Provide opportunities for *students to confront* their ideas with evidence * Help students *formulate new ideas* based on that evidence * Encourage students to *reflect* upon how their ideas have evolved | | | |
| **Student Learning Traits** | **Data to Collect for**  **Evidence of Student Learning** | **5Dimensions** | **NGSS Science and Engineering Practices** |
| All students are intellectually engaged with important science content. | Record time on task for thinking, writing, verbalizing:  #of students engaged  # of minutes students are engaged  exact student quotes  What lesson refinements that led to further engagement? | Teacher asks probing questions uses strategies and provides multiple points of entry that build upon student learning and engages all students. | Asking questions and defining problems; Constructing explanations |
| All students participate in equitable scientific discourse. | Diagram the conversation, tally seconds/minutes, record statements:  draw a diagram (How did the conversation move around a group)  assess if and how was equal “airtime” was achieved in each group  ratio of minutes - students discussing science: teacher discussing science (goal is > 80:20)  Which teacher prompts supported specific students? | Teacher uses student talk strategies so students may reflect on evidence to support new ideas. | Obtaining, evaluating, and communicating information |
| All students use evidence to support or refute scientific claims. | Sort the student work into stacks  # of students students producing where reasoning matched the evidence and claim  # of pieces of evidence each student cited | Teacher provides opportunities for student to take ownership so one may support his/her arguments and new ideas. | Engaging in argument from evidence |

**5. Generalizations to Practice** *insert into booklet—Teaching for Conceptual Change*

TITLE      date      PLC team

**Student Learning Expected**

**Instruction Details**

**Multiple Representations of Key Concept** graphic/numeric/symbolic/verbal

**Links to Research** How People Learn      Cognitive Demand

**Samples of student work on back of card**

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**Samples of student work on back of card**

**Student Handouts/Materials**

Insert supporting resources here (pictures, student sheet copy masters, etc.):