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Case #569

Using Inquiry to Design an Environmental Solution to Oil Spills

This case shows a teacher leading her class in a discussion about oil spills and then students engaged in doing an investigation they have designed to see how to best contain oil during an oil spill.

TOPICS

Science

Engineering, Technology, and Applications of Science | Life Sciences - Ecosystems: Interactions, Energy, and Dynamics | Science and Engineering Practices

GRADES

Grade 10

Frameworks

edTPA™

Next Generation Science Standards

NGSS.SEP.2 Practice 2: Developing and Using Models

NGSS.SEP.3 Practice 3: Planning and Carrying Out Investigations

NGSS.SEP.4 Practice 4: Analyzing and Interpreting Data

*In science students present grade band appropriate data showing patterns and relationships to core ideas which can be revealed and communicated to others. In engineering students analyze grade band appropriate designs by creating a model or prototype to collect data on performance, define and clarify problems, and determine economic feasibility, alternatives and failures.*

**Examples:**

Tagger observation: Students explain the model/prototype developed and the collected data of performance. Students analyze the feasibility of the prototype and offer alternatives to and failures of the prototype/solution.

Watch 16:20 - 18:59

Read selected commentary

NGSS.SEP.6 Practice 6: Constructing Explanations and Designing Solutions

National Board Standards

1

2

3

Save Case

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Video note

Access Instructional Materials

Commentary note

Add commentary note

Commentary

Background

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Resources

Open Commentary

How to add notes on Commentary

SCI AYA #569

Instructional Context

I teach in an urban public high school in which 25.5% of the population is economically disadvantaged. My class is a first year introductory level course in chemistry. There are 33 students in my 10th grade class, ranging from ages 15 through 17. The ethnic population is predominantly Asian, with the rest being White, Hispanic, Black and American Indian. There is a distinct cultural and linguistic diversity due to influx of recently-arrived Chinese, Korean and Vietnamese students who speak limited English.

My student is facing multiple challenges to the classroom due to the linguistic diversity and cultural background. Almost all have above-average academic abilities but only a small number are verbal and participatory in the class. About one-third of the class is limited English proficiency students and they are either shy or afraid to speak up due to sensitivity to their foreign accents and vocabulary inadequacy or cultural norms. Some have just arrived from China that semester and speak very little English. I am very sensitive to their feelings and if possible, I try to visually acknowledge their silent participation. I believe that eye contact with them and gestures to acknowledge their understanding is important. I have learned from experience that calling upon them in the class tends to embarrass them even more when they find it really difficult to verbalize their thoughts. With this group of students, I tend to work one-on-one with them to help them communicate their understanding. For some students, we have to resort a lot to using hand-held electronic translators and through non-linguistic representations like drawings to communicate academic content. As a result, I often had to modify instructions by having more one-on-one teacher-student discussion or peer-to-peer and small-group peer collaboration and discussion before I collectively bring them together for a whole class discussion. My students are able to carry out their scientific inquiry investigation in a laboratory classroom for a period of 2-3 weeks. Students collaborate in teams of 4 and bring their own resources for the experimentation but I tried to supply them with whatever they need as much as possible.

Planning

The goal for the scientific inquiry is for students to work independently in research and collaboratively in a team of 4 to design and safely implement a scientific investigation using appropriate techniques and resources, and then organize, analyze, and validate the data collected in order to test and revise a testable hypothesis. Students are also required to communicate the evidences and conclusions of their scientific investigation and engage in peer review of their investigation. The use of scientific inquiry in this investigation is appropriate for addressing the overall goal for the year since the class is an AVID class and inquiry is part of the WICR (Writing, Inquiry, Collaboration and Reading) component of the AVID program.