A FRAMEWORK FOR DEVELOPING A STUDENT-LED LAB ACTIVITY

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A Framework for Developing a Student-Led Lab Activity

Intention:

The nature of physics experiments (in the high school classroom) creates a perfect situation to allow students to generate their own testable questions. Many of the safety concerns that might exist in other disciplines can often be avoided when teaching classical physics, as the materials are much more benign. This catalyst was originally designed and tested in an SPH 3U classroom using the concept of friction, but it could be easily adapted to other classes and scenarios.

Scaffolding:

While presenting this process to the class, the steps were outlined using a simple scenario of the students' choosing (ex/ Does mass have an impact on the coefficient of static friction?). Particular attention was paid to identifying variables (independent, dependent, and controlled), as this tends to be a stumbling block for students, even at the senior level. Using the terms Manipulated Variable and Responding Variable helped clarify for students the relationship between variables more than the traditional Independent/Dependent phrasing.

Differentiated Learning:

In order the assist students with the open-ended nature of this assignment, they were given the option of using the scaffolded situation as their testable question. Students who chose this option could receive a maximum mark of Level Three on the assignment, whereas students who chose to design their own experiment were working towards achieving a Level Four.

Classroom Implementation and Observations:

Initially, students were hesitant to design their own experiment, as they have been more exposed to "recipe labs" and thorough procedures, but the straightforward sample questions that came out during classroom discussion gave them the confidence to take on the challenge. Students were asked to present their question and procedure before they started testing, and they came up with many novel ideas. One group even designed a procedure that used forces on an incline, beyond the scope of Grade 11 physics. After the initial explanation/class discussion, the groups needed very little encouragement, and even reluctant students of physics were able to produce grade-level appropriate work in the time given.

Assessment:

A rubric was designed in order to assess this activity. Like the lab framework, the rubric is focused on the skills of inquiry, rather than a particular concept. This should allow for seamless use in a different course or for a different concept.

Next Steps:

Thus far, this has only been used for the lab activity described, but it would be helpful in a variety of situations. It could be easily used for an introductory lab to help students understand and apply the scientific method.

Safety Considerations:

Depending on the subject, ability of students, and materials needed, there will be some variation in safety measures. This lab does not lend itself to experiments that involve hazardous materials or complicated techniques, unless the students have a great deal of experience and guidance.

COMMENTS

Kiran Pothula
November 11 at 1:39pm

Simple format- easy to follow

Permalink (/comment/362#comment-362)

RESOURCES

- Template to assist students in designing and reporting their experiment. (https://connex.stao.ca/sites/default/files/inquiry_based_lab_template.docx)
- Rubric to assist teacher in evaluating inquiry-based skills (https://connex.stao.ca/sites/default/files/rubric_for_student_led_lab.docx)
- Student exemplar - This group went beyond the scope of the grade 11 curriculum. (https://connex.stao.ca/sites/default/files/inquiry_student_exemplar_01.pdf)
- Student exemplar (https://connex.stao.ca/sites/default/files/inquiry_student_exemplar_03.pdf)
- Student exemplar (https://connex.stao.ca/sites/default/files/inquiry_student_exemplar_06.pdf)

ELEMENT

- Inquiry (/expert-elements/inquiry)

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