Amgen Award for Science Teaching EXCELLENCE

2007
Winning Lesson Plan from Granite Bay, California

Traveling Grizzlies Science Show

by Mike Fischer
Granite Bay High School

Subject: A variety of science topics (depending on choices of presenting students)
Grade Level: Presenters from 11 & 12. Target audience from elementary to junior high school students.
Duration: 90-minute shifts, during which the audience (in small groups of 8–10 students) rotates through 8 or 9 separate 10-minute mini-lessons.

Overview and Purpose

The Traveling Grizzlies Science Show (TGSS) is a major event where several high school science classes (about 32 students each) conceive, develop, practice, and finally present a science demo or "mini lesson" for younger science students from neighboring schools. HS students must research, propose, prepare, and rehearse their science lessons for the instructor and their peers to perfect it. After acceptable quality is achieved (subject to instructor's approval), high school students then take their demo on the road to one of our feeder schools, where elementary or junior high school students travel around to dozens of stations where the high school students present their lessons in 10–15 minute timeslots. It provides a wealth of science knowledge in a short time, a tremendous amount of positive energy and enthusiasm for science topics, and it benefits teachers and students for both schools.

Educational Standards Addressed:

This depends on the variety of topics chosen by students (which are subject to instructor approval), but one sample study from past year shows that dozens of different science standards were covered in one show. This is possible because the younger students in the audience gets to watch about 8 or 9 different 10-minute lessons, which cover a wide variety of science topics, all of which correlate to the state standards for Physics, Chemistry, or Earth Science. (see attached spreadsheet of state standards addressed).

Objectives:

1. To stimulate great enthusiasm and interest in science topics for all K–12 students
2. To thoroughly teach students at least one science concept of their choice by having them develop a "mini-lesson" and teach it to younger students
3. To teach younger students that science is fun, and to show how science affects their everyday lives.

Materials:

These range from liquid nitrogen procured from a local air force base by a military parent to a tank of hydrogen gas from a local welding company. Some demos have involved live animals (pets, usually) to demonstrate principles of physics.

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Procedures

1. Students must first conceive a science demo or "mini-lesson" that they came up with themselves, researched on the internet, or borrowed from a past demo done in Mr. Fischer's science classroom. Topics must first be approved by instructor before students may proceed.
2. Students must outline the steps involved in constructing a good lesson, including (based on Madeline Hunter's lesson outline model):
    a) Hook (or anticipatory set),
    b) Statement of
3. Objective:
    c) Purpose (to explain why the lesson is important and useful),
    d) Body (or explanation of concepts behind the demonstration,
    e) Performance (do the demo),
    f) Explain (or have audience explain, with presenter's guidance), and
    g) Check for Understanding (with a quiz or questions asked of audience).
4. Once outline is done, students outline safety requirements (for themselves AND their audience) and make a list of equipment and materials they need to practice and eventually present the demo (or "mini-lesson"). If safety precautions are reasonable, presenting students sign the outline promising to follow said procedures (under adult supervision).
5. Students check out materials (if necessary), and start practicing their demo. Students sign up for times after school to meet with instructor for assistance, and to provide better supervision and troubleshooting skills for those demos that "just don't work."

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Procedures (Cont'd)

6. If demo is going well, students then prepare a poster and other visual aids to summarize the concepts that their demo is teaching. Students must also write questions (or a quiz) for their audience to ensure the audience learned the concepts presented. Instructor eventually approves course materials and the demo before "dry run" rehearsal, which is done by high school students in front of their own class before going to the younger students.
7. High school students prepare all materials, equipment, visual aids, and signed release forms before loading a bus and driving to the feeder schools to present their show.
8. After arriving at the elementary or junior high school, all presenting students set up their demos on tables around the campus, based on their specific needs (near a sink, in the dark, near an outlet, outside, etc.)
9. Once the show starts, groups of 8–12 young students start at a given "station" and listen, watch, and learn as the high school students go through their lesson/demo. Younger students are invited to ask questions, participate, and get enthused.
10. After 8-10 minutes, a horn is sounded, and all groups rotate to the next "station" where another exciting science demonstration starts again. The process repeats for about 90 minutes, after which both presenters and audience take a break.
11. After refreshing supplies and equipment, the high school students perform their lessons/demos for another grade level in another 90-minute segment of "Traveling Science" demos.

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Extensions Beyond the Classroom

In past years, we have provided quizzes for the younger students' teachers to give to them. Also, we have had online surveys taken via the internet, where the audience gave feedback to individual presenters so that audience opinions determine part of the presenters' grades on the assignment. Another variation exists where elementary teachers have requested a series of demos on specific curriculum (like Electricity and Magnetism), and we have obliged their request. It's almost as if we're a "menu" from which teachers can order the science lesson for that day.

Another extension beyond the classroom applies here, because ALL demonstrators must include as part of their lesson an example where the basic concept illustrated in their demo applies to everyday life. Our goal is to generate interest, but to also apply the concepts in a relevant way for younger science students.

Attachments: (See references and examples for lesson plan)

- Topic proposal form (w/ safety precautions)
- Sample student outline
- Sample quiz
- Feedback from audience