

Lesson Plan: Scientific Argumentation

Summary

Students will be presented with the foundational tools for constructing, evaluating and critiquing a scientific argument. Students will then construct and evaluate his/her own argument about the endangered status of Atlantic salmon through a Think-Pair-Share activity.

Objective

Based on a short PowerPoint presentation about Scientific Argumentation, students will understand what a scientific argument is and why scientists construct arguments. Additionally students will be able to construct an argument, critique a classmate's argument, create a counter-argument and evaluate the veracity of competing arguments.

About this Lesson

This lesson is aligned with the National Research Council's "Framework for K-12 Science Education", specifically the Science and Engineering Practice #7: "Engaging in argument from evidence". Additionally, the "Learning Progression for Argumentation in Science" developed by Osborne et al. (2016) was used to enhance the levels of scientific argumentation that students will achieve through this lesson.

Key Concepts/ Tasks

- Construction of the three elements of an argument: claim, evidence, reasoning.
- Evaluation of evidence for appropriateness and sufficiency.
- Critique of an argument and creation a counter-argument.
- Judgment of the strengths and weaknesses of competing arguments.

Materials

- Scientific Argumentation PPT presentation with accompanying student note sheet
- Student worksheet "An Argument about Atlantic salmon: A Think-Pair-Share Activity"
- Evidence cards for each pair of students

Class Time Required

2 (45 minute) class periods

Lesson Format

Phase 1: Scientific Argumentation PPT presentation (½ class period)

Lead students through a discussion of what a scientific argument is, why scientists construct arguments and the three basic elements of an argument (claim, evidence, and reasoning). The presentation includes a non-science example of an argument (Should Mr. Smith be considered a good basketball player?). Any simple argument can be substituted. During the discussion, have students fill in the accompanying note sheet so that they have a reference for later parts of this activity.

Phase 2: An Argument about Atlantic salmon: A Think-Pair-Share Activity (1 ½ class periods)

Students will work in pairs for parts of this activity. Each pair of students needs the worksheet and a pile of evidence cards, whether face down or in an envelope, so students cannot see them yet.

Part 1: Think About It

Working on their own, have students consider evidence cards 1-3. Allow them to create their own claim, evaluate the evidence for appropriateness and sufficiency and justify their claim with reasoning. Students should complete Questions #1-5 of Part 1 of the Salmon activity worksheet.

Then ask students to consider evidence cards 4-6. Allow them to reconsider their original argument. Students should complete Questions #6-11 of Part 1 of the Salmon activity worksheet.

Part 2: Share with a Partner

With a partner, students should share the claim, evidence and reasoning for his/her argument from Part 1. At this point, the partner should just listen silently and jot down notes if necessary.

After each partner shares, students should individually complete Questions #1-2 of Part 2 of the Salmon activity worksheet. During this process, students are considering flaws in one another's arguments.

Part 3: Present your Critique

Partners should present his/her critique of the other's argument. Once both critiques have been stated, students should work together to determine which of the two arguments is stronger. Students should consider both the strengths and weaknesses of the arguments.

After agreeing upon the stronger argument, students should complete Questions #1-2 of Part 3 of the Salmon activity worksheet.

Part 4: Final Evidence

Together have students reveal evidence cards 7 and 8. Partners should create a final argument using this evidence. Together students should complete Questions #1-4 of Part 4 of the Salmon activity worksheet.

Have each pair share their final argument with the class. With this final evidence, most students should have the same argument, providing some closure to the assignment. (However, it might be helpful to note to students that scientists do not always get this type of closure.)