Think Like a Scientist

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BACKGROUND INFORMATION

Subject(s): Science
Topic or Unit of Study: Think Like a Scientist
Grade/Level: 7

STANDARDS & ASSESSMENT

Standards: [ ] NJ- New Jersey Core Curriculum Content Standards
  • Subject: Science (2009)
    • Standard: 5.1 Science Practices: Science is both a body of knowledge and an
evidence-based, model-building enterprise that continually extends, refines, and
revises knowledge. The four Science Practices strands encompass the knowledge and
reasoning skills that students must acquire to be proficient in science.
    • Range/Grade Level: By the end of grade 8
    • Strand: C. Reflect on Scientific Knowledge: Scientific knowledge builds on itself
over time.
  [ ] Cumulative Progress Indicator: 5.1.8.C.3 Generate new and productive
questions to evaluate and refine core explanations.

Assessment Plan: Teacher observation.
Class Participation.
Mastery of the concept of thinking like a scientist.

Assessment/Rubrics:

IMPLEMENTATION

Goal(s): The student will develop a better understanding of how to
think like a scientist.

The student will comprehend the main components of the
scientific method.

The student will define the terms associated with thinking
like a scientist: including observing, inferring, predictings, classifying, making models, and communicating.

Objective: By the end of the lesson, the student will understand an
overview of thinking like a scientist.

By the end of the lesson, the student will be able to explain how to think like a scientist.

Purpose:

The purpose of this lesson is to enable the students to understand how to think like a scientist.

The purpose of this lesson is to enable the students to comprehend that they think like a scientist every day and use many of the same skills that scientists do.

Procedure:

Introduction:

"Although you may not know it, you think like a scientist every day. Whenever you ask a question and explore possible answers, you use many of the same skills that scientists do. Some of these skills are observing, inferring, predicting, classifying, making models, and communicating."

Developmental Activities:

Observing

"When you use one or more of your five senses to gather information about the world, you are observing."

"Can anyone give me some examples of using your senses to observe the world around you?"

"To increase the power of their senses, scientists sometimes use microscopes, telescopes, or other instruments that help them to make more detailed observations. The information collected through observations is called evidence, or data."
Inferring

"When you explain or interpret an observation, you are inferring, or making an inference. An inference is not a fact, it is only one of many possible explanations for an observation. The only way to find out if an inference is correct is to investigate further."

"Please give me an example of inferring or making an inference?"

Predicting

"Weather forecasters use observations and knowledge of weather patterns to predict the weather. The skill of predicting involves making an inference about a future event based on current evidence or past experience. Because a prediction is an inference, it may prove to be false."

Classifying

"Grouping together items that are alike in some way is called classifying. You can classify items in many ways: by size, by shape, by use, and by other important characteristics. When things are sorted into groups, the relationships among them become easier to understand."

"You can name a place where classifying things is very important?"

Making Models

"Making models helps people understand things that they cannot observe directly. A model is a picture, diagram, computer image, or other representation of a complex object or process."

Communicating

"Communicating is the process of sharing ideas and information with other people. Communicating effectively requires many skills, including writing, reading, speaking, listening, and making models. Scientists communicate to share results, information and opinions."
Fun Activity: 20 question Do You Think Like a Scientist Game.

Student teams of 3 will play the 20 question Do You Think Like a Scientist game. The teacher will read a question and the first team to answer the question correctly will receive 1 point. The team with the highest number of points at the end of the game wins!

Conclusion/Closure:

"What are the 6 skills that are necessary to be able to think like a scientist?"

Answer: Observing, inferring, predicting, classifying, making models, and communicating.

Special Needs Component [modification(s)]:

Work with a buddy or partner.

Extra time to complete the assignment.

Monitor and check student work prior to completion of assigned task.

Provide frequent feedback, praise, and motivation to keep student on task and focused on assignment.

Sample Student Products:

Model(s) of Instruction:

Direct instruction.

Cooperative learning.

Time Allotment:

1 class period. 10 Min. per class.

Author's Reflection (s)/Critical Analysis:

Why is thinking like a scientist important and relevant to today’s students? The scientific method is a perfectly good way to do fact-finding, reasoning and analysis about real-
world problems of everyday life. Thinking like a scientist is an important opportunity for students to acquire skills they need, to discover for themselves the truth and what it means, and to be liberated from the "thought police", such as television advertisers, closed-minded parents or prejudiced schoolmates.

Through the process of learning how to think like a scientist, students will learn the many ways the scientific method can help answer the numerous questions and problems they may face in their lives. By defining the problem, seeing multiple sides of an issue and distinguishing fact from opinion, they learn how to determine what constitutes evidence and how to weigh evidence and make scientifically informed decisions.

Creating an effective learning environment is key to enhancing critical thinking, content understanding, and scientific knowledge as applied in different situations and scenarios. Many successful learning models exist, ranging from concept tests that identify student's prior knowledge to peer-led team-learning workshops; from inquiry and case-based learning projects to writing assignments with staged, structured peer and instructor feedback.

This gets back to discussing learning goals desired for the student and organizing a curriculum that scaffolds learning in a developmental sequence, the main goal being to support learning at the introductory level that will, in turn, bolster reasoning and more advanced learning.

**MATERIALS AND RESOURCES**

**Instructional Materials:**

Think Like a Scientist Graphic Organizer.

Do ou Think Like a Scientist Game question sheet.

**Resources:**

- Materials and resources:
  - Paper
  - Pencils