

Teaching about trade-offs: How science can inform the decision making process

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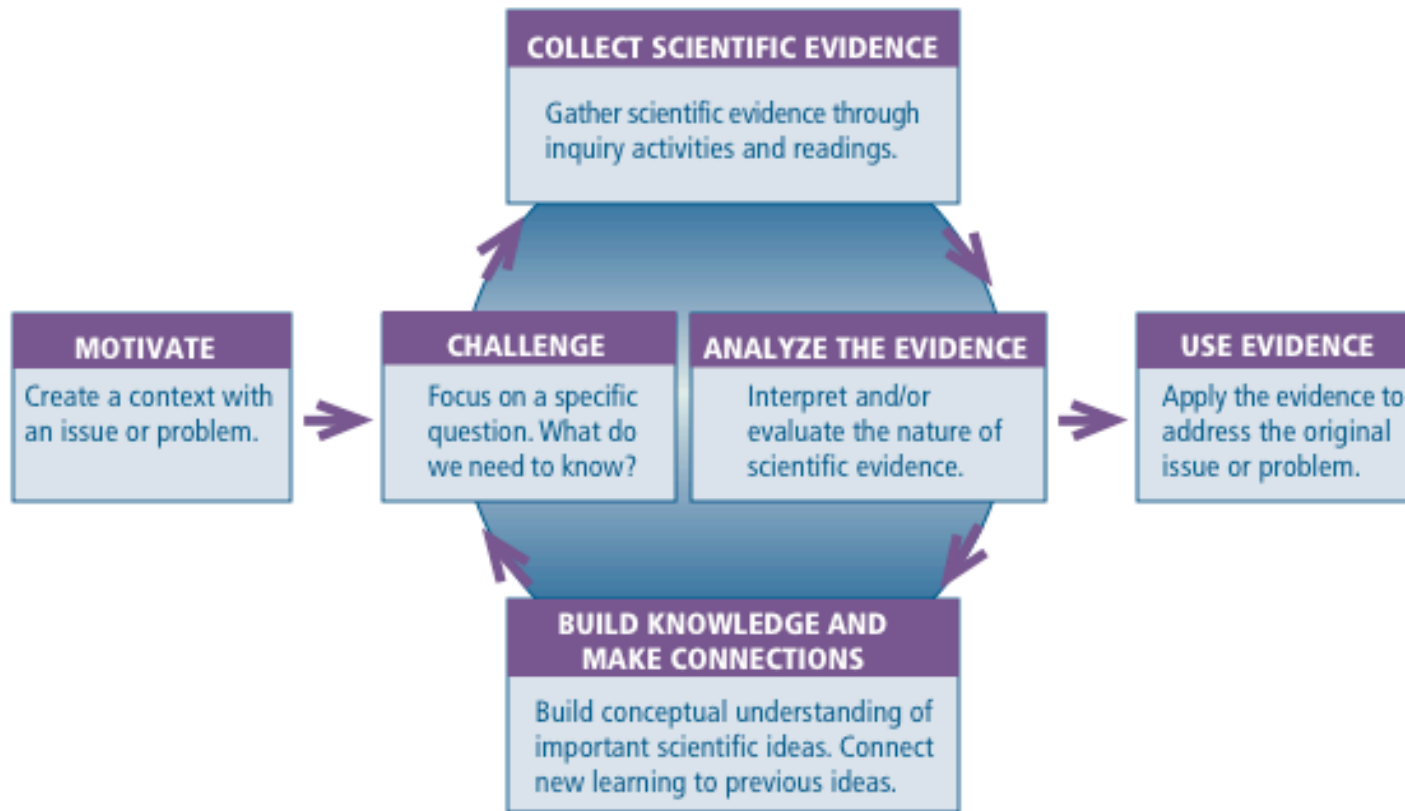
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The SEPUP Approach

- An instructional model
- Inquiry-based instructional strategies
- Issue-oriented science
- Strategies geared to students' learning styles
- Balance of individual and cooperative learning
- Spiraling of important concepts and skills
- Assessment system
- Iterative curriculum development process

SEUPUP Instructional Model



Inquiry-based Instructional Strategies

- Guiding students in active and extended scientific inquiry
- Providing opportunities for scientific discussion and debate among students
- Continually assessing student understanding
- Sharing responsibility for learning with the students
- Supporting a classroom community with cooperation, shared responsibility, and respect
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From National Science Education Standards, NRC, 1996

Issue-oriented Science

- Provides a context for science content, science process, and nature of science
- Requires the integration of science concepts and processes with social constructs and practices
- Issues are often relevant to students since life in the 21st century is closely linked with science & technology

(Sadler, Barab, Scott, 2007)

Issue-oriented Science

- The issue should not have a simple solution
- Aspects of the issue should require students to evaluate claims and evidence
- There should be opportunities for students to identify trade-offs and support and explain their reasoning

Trade-offs

- A trade-off can be described as giving up one advantage to gain another
- Since an issue by definition does not have a simple solution there will be trade-offs associated with every resolution to an issue
- Evaluating the trade-offs associated with aspects of an issue is an effective and engaging way to involve students in discussion and debate

Examples of trade-offs

Brainstorm some of the trade-offs involved in the following:

- Compact fluorescent vs incandescent bulbs
- Hybrid vs. conventional cars
- Planting GM crops
- Funding disease treatment or prevention
- Using nuclear energy or fossil fuels

The Lost Children

- An issue-oriented sequence of activities from the Genetics unit of *Issues and Life Science (IALS)*

Assessing Trade-offs

Scoring Guide : Evidence and Trade-offs

Level 4 Above and beyond	Student accomplishes Level 3 and goes beyond in some significant way.
Level 3 Complete and correct	Student compares options using accurate and complete evidence and takes a position supported by the evidence. Student describes trade-offs of his/her decision.
Level 2 Almost there	Student discusses one or more options using accurate or relevant evidence and takes a position supported by the evidence BUT reasoning is incomplete and/or part of the evidence is missing.
Level 1 On your way	Student takes a position BUT provides reasons that are subjective, inaccurate, or nonscientific.
Level 0	Student's response is missing or irrelevant.