Rural Science Education: Aligning Purposes, Policies, Programs, and Practices

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“Scholars, as such, are incompetent to translate scholarly material into curriculum” (Schwab, J.J. (1973). The Practical 3: Translation into Curriculum. School Review 81, 510-522.)
Today’s Problem in Education

Establishing coalitions, collaborations, teams, and partnerships among all groups that hold a stake in public K-12 education to align:

• Purposes
• Policies
• Programs
• Practices
Align

To bring the various elements or parts of a system into a state of consistency or coherence with each other (e.g., purposes, policies, programs, and practices)
Purposes of U.S. Public K-12 Education

- College preparation
- Workforce preparation
- Higher levels of science literacy
Guiding Vision for Science Education

Higher Levels of Science Literacy

- National Science Education Standards (NRC, 1996)
- Benchmarks for Science Literacy (AAAS, 1993)
Policies

How consistent with national science standards are:

- No Child Left Behind?
- State assessments of science achievement?
- State adoption lists of approved science curricula?
Programs

How consistent with national science standards are elementary, middle level, and high school science curricula?
Practices

How consistent with national science standards is science instruction?

• To what extent have we deemphasized teaching science as reading about science and as a rhetoric of its conclusions?

• To what extent are we teaching science via guided inquiry (e.g. 5-E Model)?
Limitations of Educational Research on Decisions about Purposes, Policies, and Programs

• Cannot determine goals or standards, which are primarily a reflection of values

• Cannot prescribe a curriculum or pedagogical approach for all students at all times
Contributions of Educational Research

• Inform decisions based on the probabilities that specific outcomes will result
• Prevent mistakes
• Show what is possible and what looks promising
Emerging Formula for Raising Student Achievement at School and District Levels

- Teachers - most important infrastructure
- Form school - university - ESC - community partnerships that benefit all members (e.g., PDS)
- Adopt & use standards-based curricula with support from administration
- Continuing (years) professional development

Guided Inquiry
Instructional Example

Black Boxes
Teaching Evolution

National standards say yes!

Many Americans say no!

How can teachers of science honor national standards and decrease students’ and parents’ perceived conflicts with evolution?
“Hot-Button” Words

True

Believe
Evolutionary theory works:

- As problem solving tool to explain and predict
- To derive benefits (e.g., medicine, agriculture, industry)
- If/when better problem solving tool is developed, scientists will use it

Scientists accept evolutionary theory based on:

- Several independent lines of evidence
- Its ability to explain and predict
- If/when contradictory evidence builds, ability to explain and predict decreases, and suitable contending theory appears, scientists will use it.


Interacting with Parents Outside Science Class

Use analogies, for example:

- Evolution or Intelligent Design
- Is science atheistic?
- It’s only fair to teach ID