

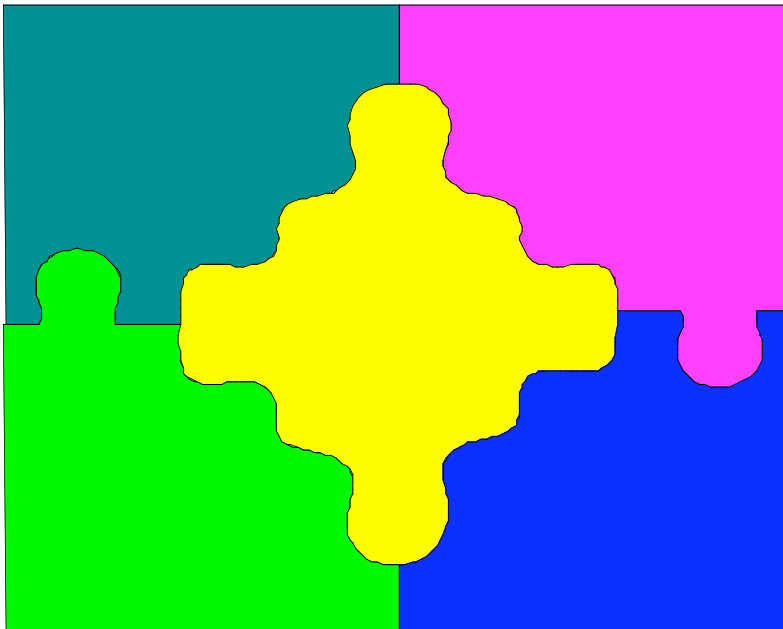


Rural Science Education: Aligning Purposes, Policies, Programs, and Practices

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Schwab's Commonplaces



Teachers-Teaching
Learners-Learning
Context-Setting
Subject Matter

“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

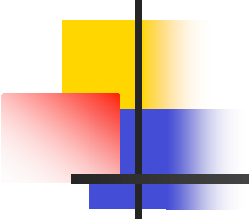
Establishing coalitions, collaborations, teams, and partnerships among all groups that hold a stake in public K-12 education to align:

- 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

See *Journal of Educational Research*, 100(4). March/April 2007.



Guided Inquiry Instructional Example

Black Boxes

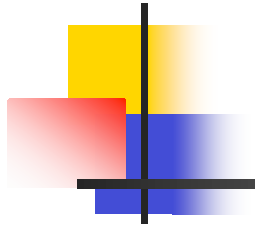


Teaching Evolution

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



Alternative Language - True

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

Scharmann, L.C. (2005). A proactive strategy for teaching evolution. *The American Biology Teacher* 67(1), 12-16.



Alternative Language - Believe

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.

Scharmann, L.C. (2005). A proactive strategy for teaching evolution. *The American Biology Teacher* 67(1), 12-16.

NAS & IE (2007). *Science, evolution, and creationism*. Washington, DC: National Academies Press.

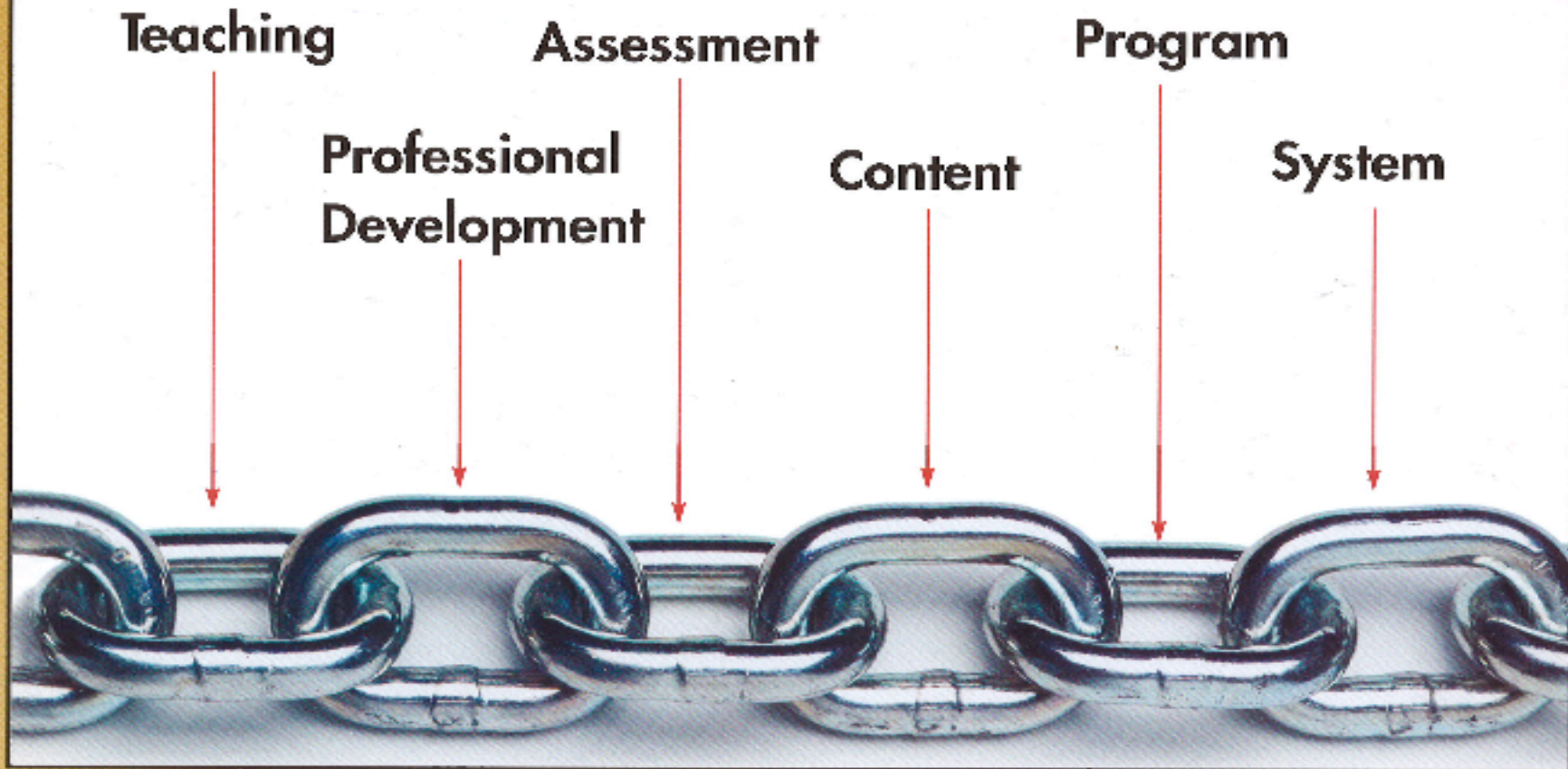


Interacting with Parents Outside Science Class

Use analogies, for example:

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

National Science Education Standards



Annenberg/CPB Math and Science Project (1996). *NSTA Awareness Kit for The National Science Education Standards*. Armonk, NY: The Learning Team, Inc.