Science Program Evaluation

Presented by: Jan Tuomi and Wendy Binder

February 17, 2011
How are you doing?

Evaluating Your Science Program in K-12 Schools
Introduce you to a quick self-assessment tool, by:

1. Gathering some information on science program assessment practices.
2. Describing the background for our standards for high-quality science programs.
3. Pointing out other routes to program assessment using these resources.
4. Finally... turning you loose with the quick self assessment.
5. Inviting you to continue the discussion and ask questions about your results in the NSTA Learning Center.
• Concern over student achievement
• Get a clearer picture of what is going on in the classrooms
• Monitor planned implementation
• Pinpoint what may be going wrong
• Get data to back up what I know the problems are
• Spur action

Why evaluate the science program?
Why do YOU care?

A. Prove I’m doing a good job.
B. Do the best possible for all kids.
C. The schools that are doing great should become models.
D. Fight complacency.
E. Other (post in chat)
<table>
<thead>
<tr>
<th>Test score analysis</th>
<th>Having and monitoring a strategic plan</th>
<th>Deployment of science instructional coaches</th>
<th>Planning by representative teacher groups</th>
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</thead>
<tbody>
<tr>
<td>Outside reviewers</td>
<td>Purchased or adopted audit tool</td>
<td>None</td>
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<tr>
<td>Teacher survey or focus groups</td>
<td>Student survey or focus groups</td>
<td>Parent survey or focus groups</td>
<td>Principal evaluation tool</td>
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<tr>
<td>Aspects of Program</td>
<td>Types of Evaluation</td>
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<tr>
<td>Instruction</td>
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<td>Assessment</td>
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<tr>
<td>Curriculum</td>
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<tr>
<td>Classroom environment</td>
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<tr>
<td>District leadership</td>
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<tr>
<td>Resources</td>
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<tr>
<td>Materials Management</td>
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<tr>
<td>School leadership</td>
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<tr>
<td>Teacher quality</td>
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<tr>
<td>Results</td>
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What is the best evaluation?
NSTA’s Mission

... to promote excellence and innovation in science teaching and learning for all.
NSTA provides national and international leadership in science education by identifying the qualities and standards for good science education; these are set forth in the form of position statements, which are used to support the improvement of science education at all levels.
37 Official Positions

http://www.nsta.org/about/positions.aspx?lid=tnavhp
Development and Review Process

- Board
- Council
- President

Recommendation

Development

- Panel
- Director of Communications
- Board/Council member

Review

- Board
- Council
- Membership
In addition...
A wealth of information

- Research Findings
  - Credible, Important Research Findings

- Reports
  - Data-rich reports reflecting consensus among experts reflecting a range of views

- Publications
  - Carefully reviewed
Manageability

- Relatively short list
- Speak to decision-makers
- Common sense
- Action-oriented
### Policy and Administrative Support of the Science Program

<table>
<thead>
<tr>
<th>Standard 1: Goals</th>
<th>A multi-year plan with clearly-stated goals guides development and improvement of the science program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard 2: District Supervision</td>
<td>A leadership team supervises implementation of a comprehensive, coherent science program.</td>
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<tr>
<td>Standard 3: Complete Curriculum</td>
<td>A rigorous, complete curriculum describes what all students should know and be able to do in science and high-quality instructional materials support its implementation.</td>
</tr>
<tr>
<td>Standard 4: Resource Allocation</td>
<td>The science program is supported by adequate resources, facilities and equipment.</td>
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</table>

**15 Systemic Elements of High-Quality Science Programs**
# Classroom Implementation of Science Curriculum

<table>
<thead>
<tr>
<th>Standard 5: Leadership</th>
<th>Leadership of administrators, teachers, and instructional coaches provides guidance, support and accountability for implementation of the science program</th>
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<tbody>
<tr>
<td>Standard 6: Instruction</td>
<td>Instruction develops student understanding of important science concepts, including scientific inquiry, and connects science learning to other subjects.</td>
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<tr>
<td>Standard 7: Materials Management</td>
<td>Instruction is supported by adequate materials supplied in a manner that minimizes classroom preparation time.</td>
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## 15 Systemic Elements of High-Quality Science Programs

![NSTA Web Seminars](image)
## CULTURE OF HIGH EXPECTATIONS

<table>
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<tr>
<th>Standard 8: CLASSROOM CULTURE</th>
<th>Classroom interactions develop positive attitudes toward learning science and model scientific inquiry.</th>
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</thead>
<tbody>
<tr>
<td>Standard 9: PROFESSIONAL DEVELOPMENT</td>
<td>Teachers continually improve their abilities to help students learn science through participation in a professional learning community</td>
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<tr>
<td>Standard 10: EQUITABLE ACCESS</td>
<td>All students experience the standards-based curriculum and the school environment values achievement and contributions of all individuals</td>
</tr>
<tr>
<td>Standard 11: STUDENT ASSESSMENT</td>
<td>Student assessments are aligned with the curriculum, appropriate in form, and develop student responsibility for learning.</td>
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</table>

**15 Systemic Elements of High-Quality Science Programs**
## 15 Systemic Elements of High-Quality Science Programs

<table>
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<th>Standard 14: - DRIVEN DECISION MAKING</th>
<th>Assessment/evaluation data are used to improve the science program.</th>
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</thead>
<tbody>
<tr>
<td>Standard 15: RESULTS</td>
<td>Indicators of student success are positive and improving.</td>
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</table>
What does that mean?
What does it look like?
What should we do?
INSTRUCTION

- Teachers plan instruction aligned with the curriculum and designed to help students understand science concepts.

- Instruction is designed to help students learn to think scientifically and understand the nature of science.

- Formative assessments guide teachers’ decisions about instruction.

- Teachers often capitalize on opportunities to connect science with other subjects.

Add specific objectives and 4-level rubrics
**Sample Rubric**

**6-B Instruction is designed to help students learn to think scientifically and understand the nature of science.**

<table>
<thead>
<tr>
<th>Component Missing</th>
<th>Incomplete Implementation</th>
<th>Basics in Place</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction is rarely planned to develop scientific inquiry abilities or understandings. Activities and assessments fail to incorporate the inquiry content standards.</td>
<td>Teachers do not fully understand scientific inquiry, or inquiry-based pedagogy. Consequently, their choice of instructional strategies, facilitation and timing of activities, and conversations with students often do not capitalize on opportunities to develop understanding of scientific inquiry.</td>
<td>Multiple times each week, students at every grade level engage in scientific inquiry in the classroom, lab, or field. This includes opportunities to design investigations, engage in scientific reasoning, manipulate equipment, record data, analyze results, and discuss their findings. Teachers model and teach scientific thinking.</td>
<td>Students routinely present explanations of scientific concepts based on evidence gathered through inquiry and scientific analysis, participate in discussions demonstrating their capacity to be flexible and creative thinkers, and draw conclusions based on data and ability to replicate results. Students have multiple opportunities each year to engage in scientific inquiries they have independently designed.</td>
</tr>
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</table>
Let’s Pause for Questions from the Audience?

Next: How do I get and use these tools?
3 ideas for dissemination

1. Expert reviewers, applying their knowledge, experience and perspective, will produce an unbiased, well-rounded report for use by local leaders.

2. Training local reviewers would help build their capacity to understand best practices and plan ongoing improvements.

3. Empowering supervisors with manageable information would support a vital element in program improvement.
**Expert Reviewers Option**

**PROS**
- Generates a detailed and comprehensive report
- Backed by NSTA
- Non-political
- Priorities defined for immediate action

**CONS**
- Perceived as threatening
- Cost considerations
- Is top-down
Questions for Wendy?

Expert reviewer option
What’s your reaction to this option?

A. Sounds great
B. Probably good for our district/school situation
C. Undecided/Need more information
D. Not sure if it would work here
E. No way
Trained District Reviewers Option

**PROS**
- Builds capacity to understand best practices and monitor program
- Cost efficient
- Potential to reach all schools

**CONS**
- Requires participation of experienced teachers.
- Outcomes may lack rigor
- May be perceived as personally or politically biased
- Ongoing use threatened by turnover, budget, etc.
• Currently choosing pilot-test site
• May become a “summer institute”
What’s your reaction to this option?

A. Sounds great
B. Probably good for our district/school situation
C. Undecided/Need more information
D. Not sure if it would work here
E. No way
<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fills an unmet need</td>
<td>• Can not assume science content or pedagogy knowledge</td>
</tr>
<tr>
<td>• Empowers a neglected driver of the system</td>
<td>• Has to be very easily accessible in terms of time, commitment</td>
</tr>
<tr>
<td>• Could drive best practices in school leadership</td>
<td>• Will a less than comprehensive knowledge of the system work?</td>
</tr>
</tbody>
</table>
Supervisors’ option status

- *Supervising Science* website under development and pilot testing
- Access modes under discussion
What’s your reaction to this option?

A. Sounds great
B. Probably good for me
C. Doesn’t apply to me
D. Skeptical
E. No way
- NSTA website
  - Professional Development tab
    - Science Program Improvement Review

- NSTA conferences
  - NSTA booth and sessions

- NSTA Learning Center
  - Discussion Forums tab
    - Web Seminars
      - Science Program Evaluation

For more information
Let’s Pause for Questions from the Audience?

Next: The quick assessment
And finally...here’s the Quick Self Assessment
Results: estimate of quality

- Flow chart style
- Based on your current knowledge
- Gets your feet wet
Levels 1, 2, 3

Curriculum
Instruction
Assessment

Just the Basics
1. Overview of Curriculum, Instruction, Assessment

2. Level 1 Goal Statement

3. Description of meeting that goal
   If yes, go to Level 2

4. If no, look at these statements...
   If these are similar to your thoughts, you are on level 1

Format
What to do

1. Go to **NSTA Learning Center**
   - http://learningcenter.nsta.org/
2. Log in or register
3. Go to **Discussion Forums tab**
4. Go to **Evaluation and Assessment** Forum
5. Then find our topic: Evaluating Science Programs
6. Download and print your PDF copy of the Quick Assessment.
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