

NISMEC/I-STEM Talks

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Thur/12:30	104	Berry, et. al.	Enjoy Learning with the HS Modeling Curriculum
Thur/1:30	104	Berry, Mikel, and VanDyke	Teacher Developed Extensions for ISI, 5 th -8 th grades.
Thur/2:30	123	Bellina	Supporting Student Scientists Writing in Their Scientist Notebook
Fri/9:30	109	Bellina	What Science Process Skills Do Middle School Children Need?
Fri/12:30	109	Berry and Hynes-Berry	Engaging Students in Science at All Grades by "Reading an Object"
Fri/12:30	125	Hicks, et. al.	Indiana Science Initiative: Effect on the Classroom
Fri/1:30	106	Morris	The Joys of Teaching AP Science!
Fri/1:30	125	Hicks, et. al.	Indiana Science Initiative (ISI)
Fri/2:30	102	Hebert	Science and Stories: Connecting Literature in the Lab
Fri/2:30	110	Eltz	Next Generation Science Standards

What Science Process Skills Do Middle School Children Need

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It Could be a Joy if

- Students came to you having the process skills needed to do science in your classroom.
- What process skills would you like them to have?
- Perhaps we could design PD for elementary teachers so that students learned those process skills.

Process Skills?

- Karen Ostland: (current NSTA president)
 - Observation
 - Measurement
 - Experimentation
 - Communication
- I think we need to be more specific
- What would your list include?

Our Process

- Please form groups of 3 or 4.
- Each person spend five minutes writing a list of the science process skills
 - needed to do science that incoming students should have.
- Discuss in your group for five minutes and be prepared to report a rank-ordered, more or less, list.
- One person please be the group reporter.

Step 2 in Our Process

- When asked please read the first item on your group's list.
- I write it on a master list and give it a number.
- If your item is already on the master list, give the number and I will place a check mark by it.
- We repeat with your next time and continue until all ideas are on the master list.
- Please no comments or questions during this work.

Master List of Process Skills

1 Complete Sentences	13 define variables	25 measurement skills
x2 Risk taking	14xx work cooperatively	
3 written communicati	15x recognize good and bad data	
x x4 follow instructions	16x active listening	
5 define a problem	17 careful observation	
6xx use metric scale	18 form accurate conc.	
7 observation/inferenc	19 acc documentation	
8 willing to ask quest	20 units conversion	
9 label numbers	21x use evidence	
10xx tables and graphs	22 modeling	
11x will discuss	23 justify from data	
12 evaluation	24 respect process	

Step 3

- If an item is not clear, now anyone can ask about it, and anyone can answer.
- Discussion continues until all are satisfied.
 - Please raise your hand to speak.
 - Please listen carefully to what others are saying.
- So many ideas...lets group similar ones.

What Do We Find in Standards?

- We consider three:
 1. National Academy of Sciences Essential Features of Inquiry.
 2. Frameworks for the Next Generation Science Standards
 3. Indiana State Standards for 5th Grade.

How do these compare with our list?

Essential Features of Inquiry

1. Learner engages in scientifically oriented questions.
2. Learner give priority of evidence in responding to questions.
3. Learner formulates explanations from evidence.
4. Learner compares explanations to scientific knowledge.
5. Learner communicates and justifies explanations.

Inquiry and the National Science Education Standards, A Guide for Teaching and Learning,
National Academy Press, Washington D.C., 2000.

Frameworks of the Next Generation Science Standards (NGSS)

- 1) Asking questions (for science) and defining problems (for engineering)
- 2) Developing and using models
- 3) Planning and carrying out investigations
- 4) Analyzing and interpreting data
- 5) Using mathematics and computational thinking
- 6) Constructing explanations (for science) and designing solutions (for engineering)
- 7) Engaging in argument from evidence
- 8) Obtaining, evaluating, and communicating information

Indiana Process Standards: Grade 5

- Students gain scientific knowledge by observing the natural and constructed world, performing and evaluating investigations, and communicating their findings. These principles should guide student work and be integrated into the curriculum along with the content standards on a daily basis.
- Make predictions and formulate testable questions.
- Design a fair test.
- Plan and carry out investigations as a class, in small groups or independently, often over a period of several class lessons.
- Perform investigations using appropriate tools and technology that will extend the senses.
- Use measurement skills and apply appropriate units when collecting data.
- Test predictions with multiple trials.
- Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
- Identify simple patterns in data and propose explanations to account for the patterns.
- Compare the results of an investigation with the prediction.

Indiana Science Initiative

Indianascience.org

- ❖ Students in k-5, k-6, or k-8
- ❖ Learn science by guided inquiry:
 - ❖ Professionally designed and tested instructional materials.
 - ❖ Activity based and student centered.
 - ❖ Materials provided and maintained externally.
 - ❖ Aligned to the Indiana content and process standards.
- ❖ Systemic professional development available for all teachers.
- ❖ Learning enhanced by scientist notebook strategy.

Indiana Science Initiative

Notebook Strategy for Investigations

Engage to Generate interest

- Focus Question - Guides toward a standard
- Predict - I think... because....
- Plan - What shall we do to answer the question?

Investigate to Answer the Question

- Data: Observations and measurements.
- Initial response to focus question.
- Claims/Evidence - So what happened; what is the evidence?

Making Meaning Conference Whole Class Conversation

How we do make sense of our results; what have we learned?

- Revised response to Focus Question.
- Conclusions
- New questions

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