Suggested Science Notebook Guidelines

Science notebooks are an effective instructional device that allow students to record what they know (prior knowledge), take notes on what they are learning and finally, reflect on what they have learned either by assimilating what has been learned or by revising prior knowledge to accommodate new learning. Information, in the form of facts and details, is essential in science but it can quickly become overwhelming; students need to learn strategies to organize and re-organize their science knowledge around important core concepts and concept relationships. Children should view notebooks as a place to record important ideas being learned, to record their own inquiries and experiences with science concepts, to pose questions, and to reflect on their own learning. As such, science notebooks should be viewed as tools for students to work with scientific concepts and make sense of their understandings by using organizing strategies that help build in-depth meaningful understanding that is, in turn, personally meaningful to the student.

Perspectives about writing:

"Writing provides a status of our thoughts and forces us to grapple with what we know and what we don't." Santa and Havens (1991).

"If you cannot – in the long run – tell someone what you have been doing, your doing is worthless." Nobel laureate Edwin Schrodinger (1951).

"The act of writing by its very nature may enhance thinking. Writing may achieve this by demanding the learner to organize knowledge." Klentschy and Molina De la Torre (2004).

STEPS IN SETTING UP NOTEBOOKS:

1. Explain Multiple Purposes of Journal (Set up chart tablet to model journal set-up and entries)
2. **Title Page** – (could be illustrated; include student name as author; draw a picture of what science means to you)
3. **Table of Contents** (leave 10 pages blank; model format for students on chart paper)
4. **Number Pages** (date as needed). Start numbering after first ten pages and use flag/sticky note to mark where to begin writing
5. **Page Heading** should include date & page number, a title (e.g. Prior Knowledge, Hands-on Activity, Reflection, Concept Map, Note-taking, Review, etc.) and a focus/goal to be accomplished (key concept)

NOTEBOOKS:

Notebooks will include a variety of writing activities such as note-taking, lab write ups, research, personal reflections, foldables, etc. All of these activities not only enhance student's knowledge of science core concepts but also helps them in organizing and expressing their thoughts.

A. Prior Knowledge:

Before tackling a new concept it is important for teachers to assess their student's prior knowledge. Here are some examples of how to journal prior knowledge:

- Students can write their prior knowledge on the left hand page and leave right hand page blank for corrections to prior knowledge and new knowledge gained through reading and experiences. These two pages can be used later on for review and studying.
- Personal reflections- Have students fill out the following:
  - Tell me about a time when...
  - What do you know about...
- Students could also write about other relevant school experiences related to the new concept such as fieldtrips, science labs, videos (fast-facts or quick note-taking), prior curricular knowledge (this year, last year...)

- This is also a great time to reinforce writing related to prior knowledge:
  - Complete sentences
  - Construct Lists
  - Phrases
  - Quotes
  - Using adjectives to describe/explain things
  - Qualitative and quantitative descriptions
- Have students explain how new ideas learned fit into what is already known. This enables them to begin "organizing their knowledge" and "making connections" between concepts.

B. New Knowledge:

Student's knowledge of science core concepts can be assessed by having them write in their own words what they are reading about. Here are some examples of how students can reinforce and organize new knowledge:

- During the reading comprehension routine, have students journal summaries of each paragraph and then have them summarize the summaries.
- Use sticky notes to identify when students have "aha" moments
- Use concepts maps to show how concepts are related
  - Use concept maps as a guide for expository writing
- Use Venn Diagrams (Compare & Contrast)
  - Write paragraphs based on Venn Diagrams
- Cause & Effect
- Predictions
- Foldables/Cutables
- Creation of Student-made Books within the journal, complete with illustrations
- Computer-generated charts, graphs, tables, illustrations, photographs
- Student Projects
  - Write an overview in the Journal
  - Attach a digital picture of the project
  - Include a rubric to evaluate the project
  - Summarize what was learned (including concepts and key vocabulary)

C. Lab write-ups:

Hands-on activities can help enhance student comprehension of text, but unless students are able to explain what happened, why it happened and relate the activity to what they are reading, the activity loses its purpose. There are two forms of lab/activity write-ups: the short form (enhances comprehension), which is a verification of a concept, and the long form, which is an open inquiry (scientific experiment).

- **Short Form (Verification of concept)** – most of the hands-on activities done in a classroom are verifications/demonstrations of one or more scientific concepts. These types of activities should be written up in the science notebook as follows:
  - What I did?
  - What happened?
  - Why did it happen?

- **Long Form (Scientific Method)** – scientific experiments are also important in enhancing comprehension and critical thinking. Scientific experiments differ from verifications in that experiments are designed to test a hypothesis. Scientific experiments require a control and variables, verifications do not. Long form activity write ups should include:
  - Question
  - Research (Background Information)
  - Hypothesis
  - Experimental Design (Procedure)
  - Results (Data Collection)
  - Analysis (Discussion of meaning of results)
  - Conclusion
  - Suggestions (questions for further investigation)

D. Research:

Biographies can be used for children to learn about science and scientists. Before doing the activity using children's picture book biographies, it is important to talk about what

science is. The following descriptions can provide a framework for students as they look at biographies of scientists in order to develop a better understanding of the nature of science and scientists:

- **Science is empirical**. It is based on observations and deals with things that can be measured and/or counted using our senses and/or a variety of tools.
- **Science claims are testable and repeatable**. Data can be obtained to support or refute each claim and can be repeated by others so conclusions can be confirmed.
- **Science is tentative.** Science is not a rigid unchanging body of "right" answers. Scientific knowledge evolves over time.
- **Science values new ideas.** Scientists value theories that raise new questions that have not been asked before.
- **Science values open-mindedness.** Good science seeks to be unbiased and objective.

Writing up a biography can be done as a group activity where each group is assigned a book that deals with a specific scientific discipline. The group must identify unique aspects of this discipline and the people who practice it. You might have one member of the group read the book aloud while the others listen and take notes about how science and scientists are described in the book. The objective is not to describe the content but rather to describe the processes and people involved. Then each student could write a paragraph that the publisher could use on the book jacket to tell the reader what the book says about science. The group can then share their paragraphs with the whole class and also give a short summary of the book.

E. Note-taking:

Note-taking allows students to become better listeners. It also enhances their organizational skills and helps them remember what they hear or read. Good readers make notes before, during, and after a reading. It is important to watch for parts of a text that seem important or interesting, and jot down questions or comments. Later on the notes can serve as a review. There are a variety of ways to take notes, including:

- **Outlines** – Outlines organize information into topics and subtopics. Broad general ideas are treated as main headings. Each of these is divided into two or more smaller topics, called subtopics. The subtopics can be divided still further into smaller subtopics. The purpose of an outline is to identify all the important information and condense it in a small space. An outline also shows how ideas relate to each other.
- **Summary Notes** – Summary notes are a collection of the most important concepts, concept relationships and details, terms, and/or events in a chapter. Students should summarize each paragraph in their own words and then use all the summaries to come up with a summarization of the entire passage. Summary notes should contain the key concepts, concept relationships and vocabulary to be learned.

- **Key Concept Notes** – This is a two-column note-taking technique. Notes from the reading or lecture are written on one side of the page, and key words that categorize the notes are written on the other. This could also take the form of Main Idea (column 1) and details (column 2). Other examples of two-column notes include cause and effect and a debate format with the support statement in column 1 and the refuse statement in column 2.

- **Concept Mapping Notes** – Concept mapping is "...a schematic device (i.e. graphic technique) for representing meaningful relationships between and among concepts in the form of propositions" (Kenny & Krathwohl, 1993). Mapping is a graphic representation of the content of a lecture. It is a method that maximizes active participation and emphasizes critical thinking. Concept mapping can be used to represent how knowledge within a domain is organized. In contrast to the teaching and learning of science as a mass of discrete facts and ideas, concept maps allow both students and teachers to organize their knowledge, build meaningful relationships, and in the process increase conceptual understanding in science. **Concept maps serve as a blueprint to model clear, meaningful paragraph writing for students and assist students in the comprehension of science content reading material**.

F. Other Journaling Suggestions

- **Labeled Diagrams**
  - Use color
  - Draw examples (e.g., water cycle, parts of flower, rock cycle, rainforest)
  - Use labels for parts
  - Write function of each part
- **Glossary/Vocabulary**
  - Create in back of the journal
  - Teacher may type glossary and give to students
- **A Journal for each unit**
  - A separate 3-hole punch holder to accompany the journal
  - Duo-tang folder
  - 3 Ring Binder
  - Accompanying folders should be the same color
  - Place student names on labels to go on notebook and folder
- Keep a **class scrapbook**
- Keep "**Invitational Journal**" with good questions (date and sign)
  - Corkboard research center, put questions on 3 X 5 cards
  - Give question on Friday that will be discussed the following week
- **Media Specialist**
  - Research on specific topics
  - Show students where to find information
- Student **Roles/Responsibilities**
  - Write description of responsibility for reference throughout the unit
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G. Grading Journals

- Select assignments for grading (not all)
- Randomly select journals for collection (once every nine weeks)