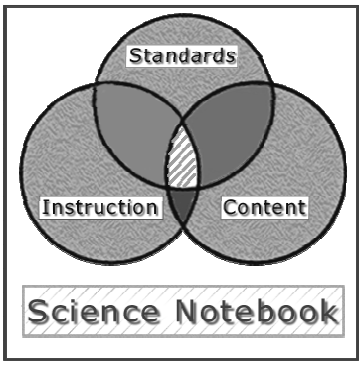
Essential Components of a Science Notebook

A Framework for Student Understanding



Question, Problem, Purpose

This is the starting point for student investigations. Student-generated or focus questions are related to an objective or standard being investigated. Questions should be investigable, not simply answered yes or no.

Prediction

Students write reasonable prediction to answer their inquiry question. Good quality predictions are based on prior knowledge and give an explanation or reason…"This will happen because…"

Developing a Plan

The student describes a detailed course of action for an investigation. A general plan is developed identifying variables and controls. Then an operational plan outlines a clear sequence and direction for the inquiry. A data collection system (chart, table, record) is created prior to the investigation.

Observations, Data, Charts, Graphs, Drawings, and Illustrations

Expressions of student strategies to collect data and describe their science experience, related to their question and plan.

Claims and Evidence

Students use the data they collected to make sense and construct meaning from their inquiry. Students build an understanding that data is evidence and that any claims that they make are supported by evidence.

Drawing Conclusions

Students record what they have learned from their investigation, not simply what they did during the process. Students express their understanding of the connection between their question, prediction, and evidence.

Reflections…Next Steps and New Questions

An opportunity for student reflection on their experience and write about what they have learned. This is an occasion to extend their investigation with a new application or question.

"Using Science Notebooks in Elementary Classrooms" by Michael P. Klentschy; NSTA Press, 2008, pg. 12-14.

Literacy Connections and Science Notebooks

When students utilize skills of questioning, hypothesizing, and reflecting in a science notebook, four areas of literacy are promoted: oral communication, writing, reading, and vocabulary development.

Oral Communication

Student talk in response to questions, in conversation with peers during an investigation, and discussion within a small group or classroom helps them to make sense of their thought process. Science notebooks can serve to facilitate oral communication and connect new concepts and information with existing knowledge. "Science Talk" assists learning – promoting the exploration and elaboration of experiences in preparation for writing.

Written Communication

The natural relationship between language development and science notebooks provide students with opportunities for written expression about authentic science experiences. Inquiry-based learning promotes higher order thinking, while a notebook provides the platform for synthesizing and communicating ideas. A deeper understanding of science can be achieved through written communication with lists, sentences, drawings, graphs, and tables. Notebook entries during an investigation model the activities of real-world scientists. Practice in informational writing after an investigation is the time for reflection, sharing evidence with others, connecting evidence to claims, and justifying new understanding to peers and teachers.

Reading

Informational literacy is a key to success in the workplace and community. Beginning or reluctant readers can be motivated by rereading their own notebook entries. This technique can be a step toward reading other informational text. Reading to research questions following an investigation can be used to verify or contradict student explanations of experimental results. It is important to prepare students to read critically and make judgments on content and sources of new information.

Vocabulary Development

Notebooks enable students to become familiar with new science vocabulary through practice, in the context of an investigation. The process of building formal scientific language skills on top of a student's informal language base is facilitated in an authentic environment. This is not the place for students to copy vocabulary and definitions, rather to make connections between new ideas and new words to express them.

Literacy Standards

The process of recording firsthand experiences, reflecting on them, and making meaningful connections allows students to achieve literacy standards by reading, writing, and speaking like scientists.

"Science Notebooks: Writing About Inquiry" by Brian Campbell and Lori Fulton; Heinemann, 2003, pg. 73-81.