

Using The Private Eye® to teach the “Big Ideas” in Science

by Kerry Ruef

This document presumes familiarity with The Private Eye process and some familiarity with The National Science Education Standards. (Academic learning requirements for most states flow from or are in sync with The National Science Education Standards.)



The Private Eye Focus:

When you use The Private Eye you're running an inquiry-based classroom; you're also fulfilling a wide range of the National Science Education Standards: Teaching; Content; and Program. The Private Eye incorporates and teaches the “Big Ideas” in Science -- (defined in the National Science Education Standards as the K-12 “Unifying Concepts and Processes” Standard - see column at right). The Private Eye simultaneously fulfills Content Standard A (“Science as Inquiry”) and Teaching Standards A & B (investigative, interactive and student-based teaching methods).

With The Private Eye jeweler's loupe + questions, students magnify not only the world but their own minds. As students employ The Private Eye strategy, their interest in a subject soars. They begin by making simple, personal, loupe-observation lists (answering: “What else does it remind me of? What else? What else? What else?”); they expand their lists into poems, essays, journals; they loupe-draw (a form of close observation). With ease students move into The Private Eye hypothesizing step (“If it reminds me of that, might it function like that?”) then test their guesses. In this way they become efficient learners, fluidly making and mining connections.

As you and your students loupe the physical world, you'll loupe your Content goals, too, whether they flow from your state's essential learning requirements or the National Science Standards. With the loupe + questions you and your students dramatically see—and communicate—the properties, characteristics and structures of life; the parts that make up the whole; the order, organization and interdependence. You'll see clearly how differences in small details make for differences at a larger scale; you'll note small changes over time and how incremental change leads to fundamental change; and you'll note change in yourself. You'll see how form and function are intertwined in nature and will exploit that link for hypothesizing. You'll see the diversity of life but also—with the analogy-provoking questions—the underlying unity of life.

The “Big Ideas” in Science (also called: the *grand ideas* or Unifying Concepts and Processes)

Excerpts from the NSTA *Pathways to the Science Standards* (1997-1998); in each edition see Appendix B: National Science Education Standards

Unifying Concepts and Processes

STANDARD: As a result of activities in grades K-12, all students should develop understanding and abilities aligned with the following concepts and processes:

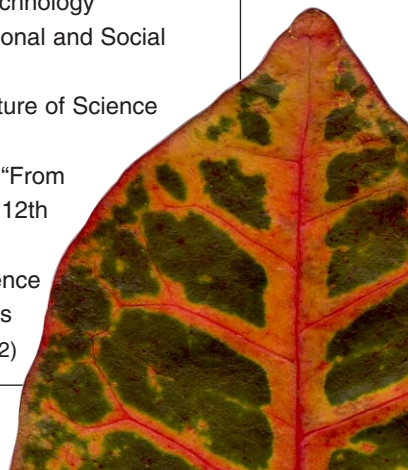
- Form and function
- Evidence, models, and explanation
- Systems, order, and organization
- Constancy, change, and measurement
- Evolution and equilibrium

“The K-12 Unifying Concepts and Processes Standard ...is generally taught [during elementary school] in the context of the other Content Standards.” (p. 29, elementary edition)

The Content Standards K-12 are:

- A - Science as Inquiry
- B - Physical Science
- C - Life Science
- D - Earth and Space
- E - Science and Technology
- F - Science in Personal and Social Perspectives
- G - History and Nature of Science

“Inquiry is the Key: “From kindergarten through 12th grade, inquiry is the thread that binds science courses and programs together.” (Ibid. p. 112)



Meeting the Science TEKS and Language Arts TEKS Simultaneously with The Private Eye®

TEKS = Texas Essential Knowledge and Skills



When you practice The Private Eye process you build and reinforce the habits of mind of the scientist, the writer, the artist, the inventor. These habits of mind are: looking closely (close observation), thinking by analogy (making connections, comparative thinking and analysis), changing scale in one's thinking, and theorizing/inventing. The following is a selection from the many Science and Language Arts TEKS met by The Private Eye. Notice the shared role of close observation and thinking by analogy (making connections) in meeting the individual TEKS. Every state has their own version of these standards.

5th Grade Science through 12th Grade Science: Knowledge and skills.

(The “Scientific Processes” TEKS are essentially the same for grades 5-12)

(2) Scientific processes. The student uses scientific methods during field and laboratory investigations. The student is expected to:

- (A) plan and implement descriptive and simple experimental investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology;
- (B) collect information by observing and measuring;
- (C) analyze and interpret information to construct reasonable explanations from direct and indirect evidence;
- (D) communicate valid conclusions; ...

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

- (A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;
- (C) represent the natural world using models and identify their limitations; ...

(4) Scientific processes. The student knows how to use a variety of tools and methods to conduct science inquiry. The student is expected to:

- (A) collect and analyze information using tools including calculators, microscopes, cameras, sound recorders, computers, hand lenses, rulers, thermometers, compasses, balances, hot plates, meter sticks, timing devices, magnets, collecting nets, and safety goggles; and ...
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Middle School Language Arts: Knowledge and skills

(6.15) Writing/purposes. The student writes for a variety of audiences and purposes and in a variety of forms. (A) write to express, discover, record, develop, reflect on ideas, and to problem solve (4-8); (C) write to inform such as to explain, describe, report, and narrate (4-8); (D) write to entertain such as to compose humorous poems or short stories (4-8); ...

(6.18) Writing/writing process. The student selects and uses writing processes for self-initiated and assigned writing. (A) generate ideas and plans for writing by using prewriting strategies such as brainstorming, graphic organizers, notes, and logs (4-8); (C) revise selected drafts by adding, elaborating, deleting, combining, and rearranging text (4-8); (I) select and use reference materials and resources as needed for writing, revising, and editing final drafts (4-8). ...

High School Language Arts: Knowledge and skills

(1) Writing/purposes. The student writes in a variety of forms, including business, personal, literary, and persuasive texts, for various audiences and purposes. The student is expected to:

- (A) write in a variety of forms using effective word choice, structure, and sentence forms with emphasis on organizing logical arguments with clearly related definitions, theses, and evidence; write persuasively; write to report and describe; and write poems, plays, and stories; ...

(2) Writing/writing processes. The student uses recursive writing processes when appropriate. The student is expected to: (A) use prewriting strategies to generate ideas, develop voice, and plan; ...