

The Private Eye® and the NGSS: Overview

Using The Private Eye Program to Address The Need for Effective Science Instruction and Student Achievement for All Students in Science

“A strong foundation in science, technology, engineering and mathematics (STEM) will put (today’s students) on the road to success in school and beyond. Important critical-thinking skills will cultivate the great thinkers and innovators of tomorrow and promote a better-educated public, and, graduates in the STEM fields will have great job prospects. Young children ask many questions, just like scientists. But by the time kids get to middle school, many think that science is hard and means memorizing a lot of facts. Far too many kids never get a chance to explore and engage in science as it is done in the real world by scientists. The time has come to make a change and help all students develop a scientific way of thinking that will prepare them to be informed citizens and ready for college and careers.

The Next Generation Science Standards (NGSS) developed by teachers, scientists and leaders in science and science education from around the country, focus on the big ideas of science and emphasize the common practices that scientists use everyday, such as planning investigations, developing models, and designing solutions. The NGSS encourage students to learn the processes of science in a deep, meaningful way through firsthand investigative experiences, instead of just memorizing facts for a test. This scientific way of thinking will ensure that the concepts children learn in school will stay with them not just for a day, a week, or a year-- but for a lifetime.” <http://www.nsta.org/docs/NGSSParentGuide.pdf>



The Private Eye helps teachers make the instructional shifts to NGSS

The Private Eye Program as an Instructional Pathway for Fostering Science Learning to Last a Lifetime

As a program that has been developing the interdisciplinary mind for over 25 years, The Private Eye Program (TPE) supports teachers in creating an effective STEM learning environment for all students. The hands-on thinking skills, creativity, literacy, and scientific literacy that are generated by TPE align to and address the key instructional shifts of the Next Generation Science Standards (NGSS).

Instructional Shift #1: What population does the National Research Council K-12 Science Framework and the NGSS target?

The NGSS calls for science instruction for ALL students. Through the wonder of looking closely at the world, thinking by analogy, changing scale and theorizing, TPE develops the four habits of mind (and thinking skills) most important to science. Using the jeweler’s loupe (magnification tool) and thinking by analogy, all students are able to build connections that keep the eye/mind looking and sustain wonder and inquiry about the world around them. All students are able to personalize their science thinking experience to use the main tool of a scientist- thinking by analogy-, in order to see themselves as scientists and engineers with TPE. The level of language or reading or math skills are not a limited when students go through TPE process to

discover, problem solve, create, invent, make decisions and think critically about the world around them— whether as a scientifically literate citizen or the scientist, technologist, engineer or mathematician that will make the breakthrough!

Instructional Shift #2: A focus on three-dimensional learning: “Elements of the science and engineering practices, disciplinary core idea(s), and crosscutting concept(s), blend and work together to support students in three-dimensional learning to make sense of phenomena or design solutions.”

The Private Eye Process and four essential habits of mind create a framework that promotes creativity and a way of thinking that allows students to **explore, examine, and use science ideas** to explain how and why phenomena occur or to design solutions to problems. It also provides a direct link between science standards and the nature of science. The Private Eye process brings the wondering, investigating, questioning, data collecting and analyzing of science to the performance expectations in a way that allows for truly blended three-dimensional teaching and learning.

Looking Closely and Loupe-Looking: Allows time for observation skills, exploration, and immediate linking to analogy making via the first Private Eye Question.

Thinking by Analogy and Private Eye Question #1-“What Else Does it remind me of?” Connections: Allows for scientific and engineering practices that support categorizing, patterns, and analogy generating for initial sense making around scientific phenomena or designing solutions.



Private Eye Question #2-“Why did it remind me of that?” Connections: Allows for inference making and initial evidence statements to enhance knowledge and understanding of the natural world and support forming an explanation.

Hypothesizing, Theorizing and Private Eye Questions #3 and #4 “Why is it like that? I wonder?” and “If it reminds me of _____, I wonder if it might function or work like that in some way?” Connections: Strong connection to the NGSS scientific and engineering practices:

- Asking questions and defining problems: Premise of TPE process and habits of mind
- Using and Developing Models: Analogies, changing scale and theorizing bring a focus to models
- Planning and Carrying Out Investigations: Hypothesizing and Theorizing using TPE provides a natural framework for planning and carrying out an investigation to test “I wonders”.
- Analyzing and Interpreting Data: Primary source data from TPE observations, hypothesizing,

theorizing and testing makes an easy transition for students to analyze, interpret and summarize results.

- **Mathematical and Computational Thinking:** Change of Scale, What else does it remind me of in math?, and natural analogies of mathematical sense making to support the phenomena creates a personalized connection to provide mathematical support of science.
- **Constructing Explanations and Designing Solutions:** TPE process provides the tools and information for deeper sense making of science phenomena and designing solutions. Teachers support this process by bringing the focus of debriefing to what happened as variables changed, the variety of sources of information, and the optimizing of solutions.
- **Engaging in Argument From Evidence:** Analogies and the wonderment of TPE create opportunities for students to do high cognitive demand thinking called for in the NGSS. Skilled teachers in TPE process provide the comfort, confidence and natural use of this practice throughout all investigations or engineering dilemmas.
- **Obtaining, Evaluating, and Communicating Information:** The specificity of TPE calls for students to draw on past and new knowledge and to continually apply the learning to new situations.



Crosscutting Concepts: The Private Eye Questioning Strategy, Loupe, and Habits of Mind support the deep, but natural connections of the crosscutting concepts with three-dimensional learning, but especially with [Patterns](#), Scale, Proportion and Quantity, Structure and Function, Cause-Effect, and Systems and Systems Models.

The Private Eye Program stresses interdisciplinary and connected thinking. The three-dimensional instruction and learning called for in the Next Generation Science Standards is the premise of TPE. Focused, coherent and engaging instruction allows for problem solving, decision making, explaining real world phenomena and integrating new ideas.

Instructional Shift #3: Performance Expectations Build Across Years: The sense of efficacy as a thinker brought forward through TPE allows students to experience and revisit phenomena or engineering situations through a different lens across the years. Exploring analogies is exploring connections, and allows for students to build off past knowledge, skills and experiences to do sense making at higher cognitive demand throughout the grade levels.

Instructional Shift #4: Instruction Builds Towards Performance Expectations: Designing instruction around rich and meaningful real-world science phenomena and practices engages students deeply in the learning process. TPE process and activities provide a framework of experiences for students as active learners that build towards the performance expectations.