

**Why Are  
School Buses  
Always  
Yellow?**

**Teaching for Inquiry,  
PreK-5**

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# Introduction

Once upon a time a group of third graders came to the American Museum of Natural History here in New York City. I was privileged to be a consultant there at the time and on the day of this visit, I guided these young students through various halls of the museum for them to gaze, wonder, and learn about dinosaurs, butterflies, and creatures of the ocean.

I remember sitting with two such students in front of a large casing within which was a real *Tyrannosaurus rex* fossil. We examined the sharp teeth, the colors and textures, and the large cavities in the head. At one point a girl asked, “Why doesn’t the dinosaur have any eyes?” This led to a discussion of the differences between bone, skin, and soft tissue. We discovered that the hard parts of the body fossilize over time, but not features like eyes and skin.

At the end of our tour, we explored the riches of the new Milstein Hall of Ocean Life where there are eight ecological niches displaying the creatures who live there and the dangers they face.

As we watched a film on the museum’s lower level, depicting huge humpback whales, dolphins, stingrays, and other creatures sporting about, the commentary explained how life began in the oceans: “About 3.5 billion years ago the ocean gave rise to the first life on Earth. Today no matter where you live, it shapes and sustains your life and all life around you” (<http://www.amnh.org/exhibitions/permanent/ocean/>).

Midway through this huge screen film with oceans crashing and whales leaping out of its depths, Angelica crab-crawled over to me and asked lots of questions. After several attempts at clarifying what she meant, Angelica finally asked, “How did life begin for fish?”

I told her that her question was interesting, asked what she thought, and suggested that we explore the answer back in her classroom.

Angelica’s question has remained with me for several years because it was so spontaneous, because it grew out of her fascination with the pictures and the commentary and, of course, because it leads toward consideration of how all life begins. I didn’t ask her then, but I now wonder what she understood by “3.5 billion years.” I assume that for her, as for me, this is a very, very difficult concept to grasp.

“How did life begin for fish?” commences what for me has been a long, exciting and vastly enriching journey of wonder and discovery with

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all the Angelicas I’ve been privileged to meet over several years. Angelica and her classmates are embarking on fascinating explorations of our natural world and of human experience and this book contains wonderings and discoveries just as magnificent as Angelica’s.

I hope along the way some of these stories about the students and their teachers will lead to your own questions and discoveries.

As the great Tennyson once observed about an aging Ulysses upon his desire for more challenges later in life:

*“ . . . all experience is an arch wherethro’  
Gleams that untravell’d world, whose margin fades  
For ever and for ever when I move.  
How dull it is to pause, to make an end,  
To rust unburnished, not to shine in use!”*

*. . . Come, my friends,  
'Tis not too late to seek a newer world.  
Push off, and sitting well in order smite  
The sounding furrows; for my purpose holds  
To sail beyond the sunset, and the baths  
Of all the western stars, until I die . . . (1842)*

We are all sailors on the seas of experience searching for those newer worlds that intrigue and transform our very selves.

Welcome.

### Fig 3.1 Inquiry Journal Stems

I noticed/observed/saw/experienced . . . and my thoughts/feelings/questions are . . .

**What** I am curious about . . .

It says, “. . .” but I do not yet understand . . .

I saw . . . and what I want to know is . . .

I really wonder why . . .

This reminds me of . . . relates to . . .

**What’s** important here is . . .

**What** I’m trying to understand/figure out . . .

**Maybe** . . . **Perhaps** . . . **Might** it be that . . .?

The big ideas here are . . .

This makes me feel . . . **What** I feel is . . .

**What** if . . .?

**What** I’m learning about my questioning, thinking, searching for answers . . .

John McPeck has recently defined critical thinking as “a certain skepticism” about what to believe, think, and do. Here is my model of what this definition is all about.

When I told my mother that I thought all grains of sand were unique, she said, “And I don’t believe that either. Have you or anybody else seen them all?”

Obviously not.

So, we model our own inquisitiveness perhaps by introducing our own models of people who asked good questions. We can do this by reflecting on these experiences and writing about them in journals.

We can also engage in “real-time” modeling of our own curiosity by bringing in items from the news or objects from our recent travels:

**News item:** Today the papers are full of stories about the conditions at Walter Reed Hospital’s outpatient facilities for returning veterans. Questions: Why did it take reporters from *The Washington Post* to discover these conditions? Why weren’t they part of routine inspections and

- questions that challenge us to go beyond what we know, to speculate, imagine, predict, for example (Level III).

We can use the Three Story Intellect (Figure 3.2) to help students make such distinctions.

My preference is for students to make their own discoveries and create their own categories, but we can surely help them by having this or another framework in mind.

**Fig 3.2 Three Story Intellect**

**LEVEL I GATHERING INFORMATION**

Describe	Name
Observe	Recite
Record Data	Recall

**LEVEL II PROCESSING INFORMATION [IN ORDER TO UNDERSTAND]**

- Compare/contrast
- Classify
- Identify variables
- Analyze
  - Distinguish cause and effect/fact and opinion
  - Pose problems, generate solutions, and solve
  - Make decisions
  - Infer and draw conclusions
  - Hypothesize, experiment, and draw conclusions
  - Explain (why) justify decisions/conclusions

**LEVEL III APPLYING/USING KNOWLEDGE**

- Evaluate
- Judge
- Imagine
- Speculate . . . if . . . then
- Estimate
- Apply a principle
- Forecast
- Create a product

Source: Illinois Renewal Institute/Skylight Publishing, Inc., 1990

### Fig 4.1 Characteristics of Problematic Scenarios

**Doubt, difficulty, uncertainty, novelty, and mystery**—That which fosters curiosity and invites exploration (Berlyne, as cited in Kashdan, Rose, & Fincham, 2004; Copple et al., 1984; Dewey, 1910).

**Complexity**—That which possesses many facets, elements, or ways of investigating. As Marzano (2003, p. 150) reminds us, complexity arouses curiosity because we aren’t sure of outcomes and there are many facets to explore.

**Boundarylessness**—That which is open to question, problem solving, and multiple entry points where people with different interests participate—not given to top-down solutions. A term derived from Jack Welch’s work with GE (Welch, 2001, p. 186).

**Robust**—Concepts are significant within the unit and curriculum (e.g., dependence, interdependence, ocean ecologies, and conservation).

**Researchable**—Information is available from a variety of sources.

**Transferability**—Concepts may have meaning within other subjects and life contexts.

**Fascination**—That which captures imagination of our students.

**“Stickiness”**—That which is simple, concrete, unexpected, credible, emotional, and story-like.

What I will outline next is an approach I have used with teachers, both preservice and experienced, in order to help us plan instruction that is mentally, emotionally, and perhaps physically challenging and that leads to deep and extensive understanding of major concepts. That is always, always our goal—high levels of challenge for all students, not just the average or “gifted and talented” students, but all students.

**Fig 5.1 Long-Range Inquiry Strategy**

**K** “What do we *think* we know about the subject?” Here we elicit and record all students’ comments be they factual or, to our knowledge, misunderstandings. We want a record of their prior knowledge and we know (C. Heath & D. Heath, 2007; Marzano, Pickering, & Pollock, 2001) the efficacy for achievement of helping students identify and relate to prior knowledge. We will emphasize “What do we *think* we know?” because, as we will tell our students, we may have some misconceptions that we will acknowledge and eventually adjust.

**W** “What do we want and need to find out?” We are interested not only in what might have stimulated students’ curiosity in our opening, initiating experiences (e.g., the coral reef videotape), but also in what students think we need to determine if we are to solve this problem or figure out the situation. Here we are challenging them to act as young scientists, historians, and so forth.

**H** “How will we go about finding answers to our questions?” This is an important step toward independent thinking and acting. We want students not only to ask good questions, but also to be able to figure out what kinds of resources will help them find answers. We also can ask here, “How will we go about organizing ourselves to find answers—e.g., use of time for access to resources, planning, working together, and presenting findings.” This step will also involve organizing and making priority lists of our questions, combining and eliminating some.

**L** “What are we learning as we move along our journey of inquiry and what have we learned at the end of our journey?” It is very important to visit this question daily as we find out new information, for it will surely lead to our asking better, more specific and more general questions.

**A** “What action will we take as the result of our inquiry? How can we apply what we have learned?” This is an important aspect of our summative assessments because the response to this challenge demonstrates the depth of understanding of content concepts and ideas. We can apply concepts and skills to other school subjects and to our lives beyond school (see Chapter 7 on assessment).

**Q** “What new questions do we have as we proceed and after our study of this unit?” Obviously, with new information we develop new questions. But at the end of our unit there should be time to reflect on newer questions, both content (about oceans) and process (about asking good questions and seeking out answers) that we can carry along into future units, thus maintaining an ongoing spiral of learning.