Reading the Book of Nature

Science Education in the Kindergarten

Jo Valens

> *There will come with the greater love of science greater love to one another. We cannot see how impartially Nature gives of her riches to all without loving all, and helping all.*
>
> —Maria Mitchell, nineteenth century astronomer

I have just been out in the woods, standing still and waiting for the birds to come back again after my approach initially disturbed them. The effort of patience relaxes into a satisfied waiting. My eyes are open, I feel the cool, wet air. Then, there it is! The fluttering wings of the chickadee—I cannot see the bird, but I have learned to distinguish that sound. When, how, where did I learn that? Nobody told me and I didn't read about it. I've learned this information over time; it's not just a thinking-knowing but a body-knowing and, as such, I feel I can claim it as my own. When one can experience such a thing, one needs very little else except, perhaps, a hot cup of tea to go home to. When Nature reveals herself to you, it fills you up. Who needs greater entertainment? As a teacher of young children, I wish to offer an education that will foster this ability to "read the Book of Nature." This, as I see it, is the essence of scientific inquiry. How can we teach this kind of "reading" in an appropriate way to the kindergarten children?

> *Men love to wonder, and that is the seed of our science.*
>
> –Ralph Waldo Emerson

Cultivating a sense of wonder is of great importance. Wonder is, of course, most natural to a child, but this inherent capacity can be dulled or even put to sleep by too many pre-digested facts and concepts. Every concept is a judgment, and although at times concepts may enhance our perceptions, they also very often can stand in the way of perception. When we perceive through the lens of concepts, the perception is not free, for it adjusts to fit the concept and we do not see what is really there before our eyes.

I've seen young children come to school with enormous amounts of facts and figures, passed on by well-intentioned adults, about solar systems, digestive systems and all sorts of phenomena in between. I think of this as "un-earned knowledge," gained without effort on the child's part. No patience was practiced, no willingness to not-know, no turning over of stones. I have noticed that this kind of information can lead to contentious social interactions in which children hoard their facts, lording them over each other and arguing about who knows more first. And yet this contentious spirit never seems to rear its head when the children learn by discovery.

Out of a sense of wonder comes curiosity. "What's under there? Is that wooly bear dead?" Or, one of my favorites, after the candle is snuffed, "Where did the flame go?" The ideal way to answer these questions is with a sense of imagination and open-endedness. We try to enter the realm where children naturally live, offering responses that can be grasped by a young child. We speak with loving respect of Father Sun and Mother Earth, King Winter and Lady Spring, all of whom relate to one another in a manner that is true to the "facts" while being, at the same time, true to the child's innate understanding of the holistic interweaving of life. When a young child asks where the sun goes at night, how are we to answer? We can describe a heliocentric universe with the sun as a mass of hot gases, and so on. . . or we can tell a story of how Father Sun has worked hard to care for his children and now must rest so that he can greet us again in the morning.

The first description is cold and even frightening to a young child. It's as though when someone asks, "Who is Henry?" we would answer with a description of Henry's bodily fluids and parts. We all know that *that* is not Henry, even though the facts are accurate. Such information about the makeup of physical phenomena is appropriate at an older age and can be learned with greater interest and respect if children have had an earlier experience of imaginative and loving learning on which to base the factual information.

Sir Isaac Newton—mathematician, physicist and one of the foremost scientific intellects of all

time—said, "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me." His insight points to how, along with a sense of wonder and curiosity, a child should be free to exercise his natural playfulness. So much is gained from rolling a marble across the floor or a snowball across the field! Or from looking at the world upside down!

The senses are our bridge between the incomprehensible and the comprehensible.

—August Macke, German painter

The development of the senses is of tremendous importance in the early childhood years. As with wonder, the senses unfold naturally in a young child and their development needs not be taught but, rather, allowed and gently encouraged to happen.

Learning to use the senses can be compared to learning to use tools. When you have learned to use pliers, you have acquired two new skills. The first is the capacity to use the pliers for the proper aims. Because you have become acquainted with pliers, you will notice the occasions in life when pliers may be useful, and now you are capable of using the tool properly. This capability arises because you meet a force within yourself that can accomplish in a non-material sense what pliers can do in the outer world. The soul discovers its ability to take hold of something. Edmund Schoorel, in *The First Seven Years: The Physiology of Childhood*, has said that when exercising their senses, children learn in a similar twofold way. They learn something new that enables them to perceive the outer world, and at the same time their soul acquires new capacities.

How do we educate the senses? We bake bread! The feel of the gooey dough and the dry flour, the smell of the yeast. . . and then the baking, and the tasting when we eat it! How about setting the table? Daily domestic life is full of sensory, motor and cognitive lessons. But we don't speak about it, we don't analyze it. Analyzing at this stage has the tendency to destroy the experience.

The young child learns with body and soul. This is why over-stimulation is counter-productive. A child needs to digest what is taken in through the senses and this is done in a healthy manner when children play. Sensory overload can lead to frantic gestures, nonstop talking, and even illness. As protection, the child's natural sensitivity may harden, requiring ever-greater stimulus to elicit a response. This can become painfully evident during the adolescent years. Given a manageable environment, ideally one including the elements of simplicity and beauty, the senses may naturally develop in a healthy way. Getting to know and trust one's own ability to perceive leads to a trust in one's own perceptions, and eventually in the ability to think for oneself—a capacity much-needed in a world of confusing and manipulated information.

Science is not fact until it is discovered.

—Ann Sagarin, Great Barrington Rudolf Steiner School class teacher

When we have wonder, we take interest. Combine interest and curiosity with healthy sensory activity, add a dose of patience, and you have discovery! Author and teacher Arthur Zajonc has said that the moment of seeing is the moment of discovery—one then perceives the hidden coherence in nature. That, he maintains, is the longed-for objective in science. I have recently been inspired by a course given at The Nature Institute in Harlemville, NY, titled "In Dialogue with Nature," through which I am learning to perceive in this Goethean sense. Craig Holdrege, one of the teachers of the course, writes in the Institute's journal, *In Context*, "The perceptual world has endless richness of detail and pattern to disclose. . . We must look, look once more, and look again. The basis of a dialogue with nature is that we immerse ourselves in perceptions. . . seeing what the plant has to reveal. . . . We are not trying to explain the plant; we are not asking about causes. . . "

Pay attention. Be present. Be awake. How can young children begin this adventure of learning about the natural world in a way that inspires them to keep on wanting to learn? Derrick Jensens provided a clue in the November 2007 issue of *Sun* magazine, "The solution is to let your child explore nature. . . Right now I'm looking at spiders on my wall, and they sit for hours, sometimes days. I often wonder what they're experiencing. I'll probably

never know unless they communicate with me. And even if they do that, I won't perceive it unless I'm paying attention, and unless I've learned at least a little of their language. And that, once again. is precisely the point."

This afternoon I waited for the birds and they came. As a teacher, I would be satisfied if I felt I had passed on to the children in my care an ability to wait and to listen. Their discoveries will lead us in the future.

In ancient Greece, it was said that all human striving after knowledge must proceed from wonder.

In every soul who seeks to reach to the truth, there must at one time be present this experience of standing in awe before the universe. Otherwise, our thinking will attain merely to what is correct, but never to the truth in its reality. . .

Someone may be the most astute thinker, but if he has never passed through this stage of wonderment, nothing will come of it; it will remain merely a spinning of ideas.

All real knowledge must, in a certain respect, have as its seed-kernel–wonder.

—Rudolf Steiner

Jo Valens teaches kindergarten at the Great Barrington Rudolf Steiner School in Great Barrington, MA.