TEACHERS’ INNOVATIONS IN K–8 SCIENCE, MATH, AND TECHNOLOGY

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THIS ISSUE’S FOCUS

Learning Outdoors
Go Outside!

The outdoor world presents infinite and indispensable learning opportunities. In this issue we learn about the strong case for taking students outside and doing our part to reunite children with nature.

Today’s children have less unsupervised and unscheduled time than in prior generations. How does this affect their understanding of systems like weather, or ideas that all life is interrelated, or their connection to a sense of place? Will this have profound impacts on the decisions and priorities that students will make in future years?

Teachers in both public and independent schools tell stories in these pages that offer examples of addressing curricula while in the great outdoors. Here are ideas for fostering curiosity, fondness, and appreciation for the world outside and our place in it. With our help, perhaps more students can embrace their role as stewards to sustain the world and its resources.

Although these sound like lofty ideals, they are not so difficult to achieve—it all starts by simply going outside!

Connect

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The Ecology of Hope  
RECONNECTING CHILDREN AND NATURE  

by Cheryl Charles

Ecology is a term my grandfather, Perl Charles, taught me. He was born in 1899, the oldest of four children of Bula and Tom Charles, who settled in New Mexico in 1907. Grandad was a lifelong conservationist, as were many in the family. He was also a teacher and storyteller. Humorous and wise, he epitomized common sense. He taught me that all parts of any environment, living and non-living, exist in relationship to one another. The most inspiring and effective teachers are those who labor with love and respect to create an ecology of hope every day in the lives of their students—in both formal and informal settings.

For many reasons, I believe that we need to demonstrate the positive power of the ecology of hope. This is especially important for those who touch the lives of children and teens throughout their schooling years. We can make conscious choices and cultivate a sense of efficacy in ourselves and others. The belief that we can make a positive difference is at the heart of hope. We can make life better for children and ourselves, by opening the door to the first classroom: the natural world, from backyards to neighborhoods, schoolyards, and public places.

We can inspire in children a belief that the world can be a better place, that the present can be nourishing, and the future a time of fulfillment. We can go a long way toward achieving that goal by reconnecting children and nature—beginning where children spend most of their daylight hours during many weeks—in their schools.

Beyond the cocoon

Let’s start with the current baseline. Most children and youth today have limited direct experience with the outdoors. If they are outdoors, the experience is more likely to be in organized sports and on playground equipment, often on asphalt playgrounds. There are exceptions, but, on the whole, the defining experiences of today’s youth and children are indoors, at home or in school, or in a car. Shuttled from school to church to soccer to dance class to day camp, most of our children are—with all good intentions—being given a virtual, vicarious, electronic, passive, and cocooned experience of childhood. Or, they are left alone, under what author Richard Louv calls “virtual house arrest”—left on their own for hours and hours at a time, hooked into what I call the electronic umbilica of today’s contemporary lifestyles.

I am not at all anti-technology. However, the current lifestyles and learning environments for most children and youth today are out of balance, with a disproportionate amount of time spent out of sunlight and facing electronic screenlights from computers, televisions, cell phones, and more.

Richard Louv’s recent work has been part of our inspiration for publishing an issue of Connect on learning outdoors. He is the author of many books dealing with childhood, culture, and the outdoors. Several articles in this issue cite this book as being an important resource.

Last Child in the Woods: Saving Our Children from Nature Deficit Disorder is the oft-cited work which examines our children’s play and attitudes toward nature, as well as the attitudes and ideas of adults who raise and teach children. Combining extensive research, his own insights, and quotes from many experts, Louv writes a highly readable book with a mountain of information. In addition to outlining problems and tension in the relationship between child and nature, he offers valuable suggestions for remedying that disconnection. This provides great background and inspiration to get your kids outside! It is published by Algonquin Press, http://www.algonquin.com.

A host of lifestyle changes in U.S. society in the past twenty to thirty years has contributed to a sedentary society of youth, who, according to a study conducted by the Kaiser Family Foundation (2005, 2006), are spending as much as sixty hours a week involved with electronic media. One of the major contributing factors is that adults fear for their children’s safety. A study in 2004 found that 82% of mothers with children between the ages of three and twelve cited crime and safety concerns as two of the primary reasons they do not allow their children to play outdoors (Clements, 2004).

Parents are busy, often worried, and frequently burdened with a host of pressing responsibilities. Teachers are pressured to be accountable for record-keeping and test scores that, unfortunately, often get in the way of students’ optimal learning.

Learning in context

The evidence indicates that one of the best antidotes to stressful lifestyles is spending time in natural settings outdoors. Further, students will be happier, healthier, smarter, more cooperative, better problem solvers, and more creative if they have frequent opportunities for learning in the outdoors as an integral part of their everyday lives. It is time for schools—their teachers and their students—to truly open the windows and doors to get outside for many breaths of fresh air.

Children need leisurely, unscripted, and exploratory hours to find the wonders in their own backyards and neighborhoods, from discovering the beauty of the stars in the night sky to watching lizards on a warm summer’s day. Instead, committed to hectic schedules, children are left with little time for unstructured play in the outdoors.

As important as play in natural settings is—and it is dramatically missing from the lives of children—so too are opportunities for direct learning outdoors as a fundamental part of the school curriculum. The best way to make learning meaningful is to do so in context—in children’s whole lives and in their nearby surroundings. They learn, they gain confidence, and they develop a sense of place—all of which combine to create self-confident, competent, capable, and caring adults.

From deficit to benefit

Outcomes of children’s disconnect from nature include: diminished health; obesity; reduced cognitive, creative and problem-solving capacities; lower school achievement; lower self esteem; less self discipline; and, evidence suggests, attention deficit hyperactivity disorder.
(ADHD). In schools where children learn outdoors as part of the curricula, all those deficits are addressed.

The benefits are also great when children simply have the opportunity for free play in nature-based settings on school grounds. Students are more self-disciplined, have higher self esteem, are more creative, and better problem solvers. The evidence indicates that they score better on a range of standardized tests in all major subject and skill areas. Combining naturalized school grounds and play areas with a nature-based curriculum, the benefits are likely to grow even more significantly. It would also seem highly probable that doing so would make a major contribution to reducing and reversing the trend toward nature-deficit disorder in today’s children and youth.

Children’s cognitive flexibility and creativity are enhanced if they have the experience of problem-solving in natural settings versus highly controlled, adult-dominated, managed settings, like concrete playgrounds and manicured playing fields with little ecological diversity. Beyond cognition, there are mental health benefits. There is now a substantial body of work that indicates that children who play in the out-of-doors on a regular basis score better on a range of standardized tests in all major subject and skill areas. Combining naturalized school grounds and play areas with a nature-based curriculum, the benefits are likely to grow even more significantly. It would also seem highly probable that doing so would make a major contribution to reducing and reversing the trend toward nature-deficit disorder in today’s children and youth.

Children’s cognitive flexibility and creativity are enhanced if they have the experience of problem-solving in natural settings. These boys are working on an orienteering challenge.

**ACTIONS WE EACH CAN TAKE**

**OUTSIDE OF SCHOOLS**

- Take a child outside.
- Encourage nature-based, child-friendly spaces and places throughout our communities.
- Make reconnecting children and nature a priority.
- Educate parents, grandparents, and other caregivers about the cognitive, physiological, and emotional benefits to children who play in the out-of-doors on a regular basis.
- Encourage physicians to prescribe nature-play, because it is good for children.
- Educate architects, builders, community planners, and civic leaders about the need for areas of native habitats in planned developments and existing neighborhoods, so children have places to play that foster their imagination.
- Build new partnerships, and support existing efforts, to bring the resources of the private sector together with public agencies in bold, balanced, and conserving ways to achieve a sustainable future.

**INSIDE OF SCHOOLS**

- Reinstate recess where it has been eliminated.
- Integrate outdoor experiences throughout the school curricula.
- Affirm those teachers who have always brought the outdoors indoors, with live plants, natural materials, ecologically-based learning laboratories, and opportunities to connect with the outdoors.
- Maintain, expand, or add areas of native plantings, schoolyard habitat projects, school gardens, and diverse natural areas to the school grounds and nearby neighborhoods.
- Get parents and the community involved—because nature-based learning is good for everyone.
cates that the simple act of going outdoors reduces people's stress, anxiety, depression, and attention-deficit disorders. With people of all ages, the results are dramatic. Their peacefulness and general wellbeing are enhanced to the degree that they spend time outdoors on a regular basis.

So there are immediate physical payoffs for those of us who get outside, but there are obviously more. If we are outdoors often enough to watch and experience the seasonal changes, we learn about “place.” We learn about the natural cycles and changes within an ecological context. To the extent that any of us does that on a regular basis, we will be more inclined to have a complex and informed understanding of that natural system, and potentially other natural systems. We will be far more likely to care about the health of living systems over time, more likely to make informed decisions, and more likely to effect responsible actions.

Our living legacy

Together we can heal the separation between children and nature, beginning in our schools. We can reinstate joy, wonder, and a sense of purpose. We can re-establish a healthy, natural balance between technology and natural systems. We can build a movement that succeeds in reconnecting children and nature—and in that process inspire a new generation to believe in a better future. We can be a generation that leaves a legacy of leadership, learning, and an ecology of hope.

Cheryl Charles, Ph.D., is an educator, author, innovator, and organizational executive living in New Mexico. She is a co-founder of the Children & Nature Network, http://www.cnaturenet.org. She was the founding National Director of Project Learning Tree and Project WILD, and has received numerous awards for her leadership.

Resources

We were thrilled! For twenty-five years the students at The Neighborhood Schoolhouse in Brattleboro, Vermont, had been hiking, snowshoeing, camping, tracking, playing, and learning behind our school in the many acres of forest owned by a separate non-profit organization. Finally, a local cartographer was going to map “our” woods. Having a pictorial representation of all those best-loved places to take inside with us sounded great!

Our classroom culture

The Neighborhood Schoolhouse is an independent school serving families with children aged two-and-a-half to twelve. John, my co-teacher, and I work with the older children in a multi-aged classroom for six- to twelve-year-olds. Our overarching theme for this school year is Mysteries. We have honed our senses, curiosity, and patience to gather clues, trying to solve mysteries relating to science, math, language arts, nature, and the creative arts: How can birds fly? Who dunnit? What does the appendix do? What happens when I mix red and yellow? What is it like in Antarctica?

Using the inquiry process, we have spent a lot of time wondering, exploring, researching, comparing, and gathering data. Our multi-aged setting offers the students a chance to appreciate each other’s interests, intrigues, and knowledge. The children help each other solve mysteries but we also invite Mystery Guests to come into the classroom to help us investigate areas in which we are interested and topics we are studying. The students don’t know the purpose of the guest’s visit and must first ask thoughtful yes or no questions to learn of the person’s area of expertise. Although the students did not yet know it, the cartographer who mapped our back woods would soon be coming into the classroom as a Mystery Guest.

We had already been in the woods many times this school year. We had visited Gnome Village—the gnome-sized collection of homes, parks, trading posts, and gardens that we add to every year. We had eaten our snack at the Circle of Logs. We had scrambled around in The Big Pit. We had visited The Great Old Oak. We had investigated The Quarry. Everywhere we went we encountered new mysteries to unravel. While at The Quarry, we discovered a mysterious egg sac of some kind in the water and took it back to school to investigate. Using our Intel Qx3 microscope connected to our computer, we took pictures and videos of it magnified 60 times. We spent a lot of time observing the inhabitants of the gelatinous mass and it became affectionately known as “The Worm Blob.”
Mysteries and morals

We had had a big discussion about The Worm Blob. We had originally found two of these gelatinous masses. As a group we decided that we should leave one there untouched, but that we would borrow the other one to try to learn something about it. A few weeks later, after observing the inhabitants of The Worm Blob grow larger and begin to look more like baby lobsters, we began to feel guilty. What if they hatched in the terrarium and they didn’t have the right environment in which to survive? We decided that we should take them home to the quarry. When we got back to the quarry, we were shocked to find it had almost completely dried up!

Now we had another moral dilemma. Was our beloved Worm Blob, which had become a class mascot of sorts, better off outside where nature would run its course, or inside where we had a terrarium with pond water, decaying leaves, and mud—a virtual fun park! With mixed feelings, we returned it to its home to await its uncertain future.

What’s in a name?

We had a new quest: What about The Reservoir? Was it dried up, too? We walked further into the woods to find out. With confidence, the kids led the way along the familiar Loop Trail toward The Reservoir. At every turn we made, we discovered brand new signs marking the trail. It turns out that we weren’t on The Loop at all. According to the new sign, we were on “The Upper Woodlands Trail” that led to “The Main Trail,” which led to “The Ice Pond Trail.” We were so distracted and confused by these new helpful signs that we took a wrong turn. The children figured we must be lost and that we must be miles away from our destination—The Reservoir. We were lost, and tired, and hungry. We took a break for snack.

Things went from bad to worse. A car appeared in our woods! Cars never drive through our woods. A woman emerged with her dog. She explained that she had just heard about this great road leading up to the Ice Pond. Her dog was old and liked water, so driving right up to the water was a perfect solution. We were baffled.

Refreshed from our snack and curious about this “Ice Pond” we ventured on.

“Hey! I know where we are!”

“This isn’t an ice pond, this is The Reservoir!”

“We made it. And look, there’s still water here!”

We stayed there for an hour making boats to float in the water, inventing contraptions for fishing out a rejected soda bottle, picking up pieces of broken bottles, and petting the woman’s aged dog. It seemed that a whole new group of people was now attracted to our woods.

We were experiencing a culture clash! There was a new language introduced by someone else who clearly didn’t know these woods the way we did. There were people driving through the woods, leaving behind their trash, and putting up sign posts. All because these trails—our trails—now had names—someone else’s names. We felt invaded.
Our Mystery Guest

The day of the Mystery Guest’s visit had arrived. After asking several questions, the kids guessed his purpose for visiting us. Yes, he had something to do with what we were doing in the woods. No, he had not put up the signs. When they learned that he is a cartographer, the kids asked if he was going to help them make a map. Sadly, he had to explain that the map had already been made and no, he did not make up the names of the trails. He had to use the names that someone else had given him. He knew that some of the trail names were from a map from the 1800’s, but they had been rearranged. Others had been newly invented. When the kids saw the map, they wanted to know where The Labyrinth was, and The Quarry, and The Great Old Oak. None of those things were on the map. But still, it was neat to see all the lines and lines of trails. There were lots more than we knew about.

Making it our own

We felt pretty important as we helped Jeff, the cartographer, hang the official map in the kiosk by our school. We were thrilled when he gave us an enlarged map of the section of the woods between our school and the reservoir. The map focused on the part of the woods in which we spent the most time and, best of all, there were no trail names at all! We could label the trails the right way, with our names for the trails. And we could add all our important landmarks.

The next week we were back out in the woods. In order to add our own points to the map, we had to measure the distances between points and compare them to points on the map. We measured the distance from the school along The Upper Path on The Loop to The Labyrinth: 131 feet. The Labyrinth to The Quarry was 1,472 feet. The Loop to The Great Old Oak was 515 feet. We would keep measuring until we had enough information to accurately place all our favorite places on the map. In the meantime, we would continue to love, live, and learn in our woods.

Life lessons learned

Since the official maps have been posted, we have noticed a lot more cars parked at the trailhead by our school. The other trailhead by the old road is now clearly marked so people know to use the path on foot. We’re glad people are enjoying our woods. We are happy to share. After several group discussions we came to the realization that changing the name of a place cannot change our memories or experiences attached to it. Likewise, other people’s experiences in the woods do not negate our own. We have decided that the woods can be multicultural. Other people can have their names for the trails and their personal experiences with the woods and we can have ours. We have more important things to worry about—like how to map the trail we use to get to Gnome Village. We’re kind of glad that landmark was left off the map. It will stay our little secret.

Jen Manwell co-teaches a multi-age group at the Neighborhood Schoolhouse in Brattleboro, Vermont.
While traveling recently in Panama, we observed a pickup soccer game taking shape. A gaggle of perhaps fifteen kids, boys and girls, teenagers and small-fry, started running back and forth on a vacant lot booting a beat-up ball. Periodically, new kids would join the mêlée while others dropped out for a break. The make-up of the teams seemed ever-changing, but everyone seemed to be having a disorganized good time. There was no adult in sight, no stripe-shirted referee. It reminded us of our footloose childhoods and, it looked totally unlike the experiences of our two teenage daughters.

Unlike us, our daughters have been growing up in suburban Washington, D.C. They attend independent schools outside our neighborhood. When they were small, whenever they wanted to get together with friends, we would call families up, arrange play dates, and drive them over. As they became teenagers, instant messaging, Facebook, and cable television proved irresistibly alluring. They played organized sports, but only in school and in city youth leagues, never in neighborhood pickup games. They rarely seemed to get on a bike and cruise the neighborhood looking for someone to play with. Why do that when they could be assured of constant, effortless entertainment at home? Why risk boredom and uncertainty? Besides, who could know that the neighborhood would be safe, free of nefarious characters lurking behind every bush and tree?

Aside from summering in a rustic (no electrical appliances) New Hampshire cabin, it is safe to say that our daughters’ childhoods are typical for a lot of American kids. In his book, *Last Child in the Woods*, Richard Louv eloquently makes the case that kids today are spending less time outside, less time engaged in free, spontaneous play, and less time in contact with the natural world than any generation in recorded history. He has coined the phrase, “Nature Deficit Disorder” (NDD), and he wonders about the kinds of people such adult-directed, indoor-focused child-
hoods will be creating. How creative, independent, and physically fit will our kids be when they grow up? How much empathy for nature will they have?

As eighth-grade environmental science teachers at Sidwell Friends School, an independent Quaker institution in Washington, D.C., we share Richard Louv’s concern. Sidwell Friends is an unusual school. Two years ago, recognizing the critical importance of environmental stewardship, the school constructed a new middle school that became the first platinum-rated LEED green school building in the world. LEED stands for Leadership in Energy and Environmental Design. It is the program employed by the U.S. Green Building Council to evaluate and rate “green” buildings, and platinum is the council’s highest rating. It is our fortunate charge to help the students inside the building understand why we felt it so crucial to construct it.

A threefold strategy

In our environmental science course we want students to question their assumptions, develop their ethics, and reflect on how they intend to live their lives. Most of our students are experiencing urban or suburban childhoods resembling those of our daughters and those Louv describes, and find it difficult to connect with nature and care about its welfare. So, we have asked ourselves: Is there anything we can do to confront our students’ NDD?

Perhaps we are not in an ideal situation for this task. Sidwell Friends is located in a residential neighborhood in northwest Washington D.C., not in a glorious nature reserve. We don’t think that releasing our students to regularly engage in “free outdoor play” will thrill our principal. And besides, as eighth graders, aren’t they beyond the age when deep connections with nature get imprinted in people’s souls? On the other hand, neglecting the issue entirely strikes us as a dereliction of duty. Ultimately, we have settled on a three-fold NDD strategy:

At the beginning of the year we ask our students to briefly consider the idea of Nature Deficit Disorder. We want them to reflect upon their lifestyles and see if they want to make changes. We also want to draw their parents into the course, hopefully inspiring, in some households anyway, a routine of discussing the topics that we cover throughout the year.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Adults spent more time than child</th>
<th>Adults spent less time than child</th>
<th>Adults and children spent about same amount of time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoors</td>
<td>177</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>In adult-organized activities and sports</td>
<td>19</td>
<td>197</td>
<td>28</td>
</tr>
<tr>
<td>Inventing games and “free play” outdoors</td>
<td>191</td>
<td>26</td>
<td>27</td>
</tr>
<tr>
<td>Being driven around in a car</td>
<td>12</td>
<td>226</td>
<td>14</td>
</tr>
<tr>
<td>Observing nature</td>
<td>120</td>
<td>48</td>
<td>74</td>
</tr>
</tbody>
</table>

QUESTIONS FOR THE STUDENT TO ANSWER:

Having read this article, would you describe yourself as a person who experiences Nature Deficit Disorder?

Yes: 62
No: 54

Do you feel that most of your peers experience Nature Deficit Disorder?

Yes: 91
No: 15

Do you think that Nature Deficit Disorder is something we should be concerned about?

Yes: 98
No: 17

(Note: The data from some of the classes regarding the last three questions is missing; hence the low numbers.)

If you are interested in bringing this survey into your classroom, you can find it on the National Environmental Education Week Web site. The Web site sponsor, the National Environmental Education Foundation, is tabulating the results from around the country, and your students can join in.
Bradford McKee wrote *Growing Up Denatured*, a review of Louv’s book (which can be downloaded from the Web site of the National Environmental Education Week, [http://www.eeweek.org](http://www.eeweek.org)). Once the students read his article, they go home and ask their parents a few questions comparing their childhoods with what they see today.

Of course, our students have not been around long enough to know the childhoods of any other generations, so our goal is to provide a frame of reference by revealing to them how their parents grew up. Once the students finish surveying their parents, we ask them to draw some conclusions about growing up in the 21st Century. On the previous page are the survey questions we use, and the results we have obtained in three academic years.

A couple of observations about our results: First, many people living in the Washington, D.C., area have grown up somewhere else. Our parent responses, therefore, reflect childhoods in both rural and urban areas, in countries around the world. That their answers coincide to such a degree is significant. Secondly, we note that our students seem to think that their peers are afflicted with worse cases of Nature Deficit Disorder than they are. Often, however, their reasoning is that they are not suffering from NDD because they are outside a lot playing adult-organized sports. Only occasionally do we read that our students are spending quality outdoor time in free play. We’re not sure that our students always see that all outdoor experiences are not equally effective NDD antidotes.

### The bee survey

Our second tactic is to get our students outside as much as we can. When we do this, we still have to meet curricular objectives using appropriate academic rigor. At the moment, then, our students are primarily using outdoor time to carry out a campus-wide bee survey. The students set out small blue, white, and yellow bowls filled with soapy water in various habitats around the school, such as ornamental gardens and weedy roadides, to attract and catch the bees (presumably, the bees think the bowls are flowers). We then collect, pin, and label our specimens and send them to a scientist at the U.S. Geological Survey for identification.

Our results so far have amazed us. Before this project, we noticed perhaps four or five species of bees flying around: honey bees, bumblebees, carpenter bees, etc. Our survey, however, reveals that we have at least forty-eight species on campus. Six of these have not been recorded anywhere else in the city. The point we want to make to our students is that there is a lot of hidden diversity, even in urban areas, and a lot of interesting creatures to find if we take the time to look.

### Amazing and marvelous

Lastly, throughout our teaching, when discussing scientific concepts and ideas, we emphasize that nature is beautiful and bizarre. So much science education seems, to us, to ignore fostering in our students a deep appreciation for, and curiosity about, the natural world. If all kids get is a rote presentation of facts and a relentless focus on the “scientific method,” then we cannot expect them to acquire an emotional

*Drilling holes for the bee boxes*
attachment to nature and a commitment to its welfare.

And so, when we discuss evolution, we use odd examples to illustrate our points, favorites being island creatures like giant tortoises and kiwis, and assorted evolutionary oddballs like devil's hole pupfish and Texas blind salamanders. When we look at pollination, we bring up orchids mimicking female wasps to get pollinated by clueless males, and arums fooling flies by pretending to be corpses. When we consider symbiosis, we bring up a wide array of strange examples, such as ants protecting caterpillars from predators or moths living inside the green fur of sloths. We constantly emphasize how amazing it is that such marvels inhabit our planet. Then, we ask our students what life would be like without them.

How successful have we been in combating Nature Deficit Disorder? We could only answer that question with confidence if we knew how our students would feel about, and interact with, the natural world once they had left Sidwell Friends. Unfortunately, because random anecdotal information is all we have, we really don’t know.

It seems a paradox that no generation of students has ever been so concerned with environmental issues, notably global climate change, yet also more estranged from the natural world. The idea of Nature Deficit Disorder spreading across the land has strengthened our resolve to narrow this gap. We hope to help develop in our kids an empathy for the natural world that accompanies their concern for the human condition.

We are bringing to our students’ attention how generally disconnected most human beings are from the natural world and what the consequences of that may be. We are encouraging them to look critically at their lifestyle choices. And, we are developing a common agenda with our students. They know why they are taking eighth-grade environmental science, and they appreciate it. It makes our job a lot easier.

David Wood and Margaret Pennock, husband and wife, teach eighth-grade environmental science at Sidwell Friends School in Washington, D.C.
One snowy February evening, seventy people gathered in the hallway outside of our elementary school cafeteria in Gilford, New Hampshire. Behind the closed doors, excited voices called out, “It’s almost time.” The doors slowly opened and two greeters came out. They announced in clear voices, “Welcome to Marvelous Mammal Night.” For my second graders, this night was a celebration for weeks of hard work.

Inside the large room, eager students hosted exhibits showcasing investigations exploring the attributes and survival adaptations of local wild mammals. The displays included a wide range of interdisciplinary work ranging from research reports and geographical maps, to colorful posters, graphs, and handcrafted diaries. Guests visited each one of the exhibits with a student-created scavenger hunt list in hand.

The children engaged visitors with facts they had learned, played teaching games they had created, and shared artifacts they had developed. The program concluded with individual poetry readings, a song, and a community feast.

How we began

Marvelous Mammal Night had its origins in September, when my second-grade students began a yearlong investigation of our natural community. Gilford Elementary School is surrounded by a variety of habitats: meadow, stream, beaver pond, and deciduous and conifer forests. They are ideal invitations for student explorations. Our weekly explorations take on a variety of forms that range from seed collecting and nature journaling, to scavenger hunts and conducting surveys.

However, there is another environment to be considered. Like other schools throughout the U.S., the driving force of standardized testing has also changed and impacted our school district. Time for instruction is critical; any time outdoors must provide justifiable opportunities for learning. The question commonly expressed by teachers is, “How can I spend time outdoors when there is so much to teach?”

When the classroom extends to the outdoors, students’ engagement and understandings are maximized. There are multiple opportunities for the children to make important conceptual connections. These understandings are evidenced across the disciplines, through the application and practice of both student knowledge and skills; for example, outdoor observations are guided by our senses. The children are asked to use descriptive words and details to share what they have observed. Back in the classroom, this emphasis on details and description enhances the quality of their writing.

Essential questions

I am fortunate to have my students for both second and third grade. Although I have two different curricula, our studies are guided by the following essential questions, which provide the conceptual connections for all of our studies: The questions are based on the ecological concept of community as, “A group of inter-
dependent organisms inhabiting the same region and interacting with each other.”

1. **What makes a community?** The children learn that each member of a community has a special niche. In our first year together, this definition extends from our class community to include our natural and town community. In third grade, we explore the communities of different biomes and native cultures.

2. **How does change affect a community?** In second grade, our outdoor investigations focus on local changes. In third grade, while we continue our weekly forays outdoors, we examine how our community, both natural and town, has changed over time.

3. **How does where you live impact how you live?** This question guides our learning to observe what living things do to survive in different environments, encompassing both behavioral and physical adaptations.

4. **How does diversity affect a community?** For our nature studies, we first observe who lives in our community. Then we study how they interact. Over the weeks, we expand illustrations of simple food chains into food webs. Class discussions on the relationships between prey and predators evolve into questions on survival adaptations. Observations of lacy-leafed tree fungi initiate lessons on the role of decomposers.

5. **How do the choices we make impact a community?** We evaluate how our individual choices and how the choices of others impact the trails, for better or worse. We study how choice has impacted our community historically, as in the Civil War.

During those early weeks, students learned the value of quiet observations. As seven-year old Anna expressed, “The more you look, the more you see; the more you see, the more you want to look.” I gave each child a nature journal in a plastic bag that also contained a magnifying glass, pencils, newspapers (for sitting upon), an eraser, and a sharpener. When we found a place to investigate, we would spend a few minutes exploring the area as a whole group. I next asked the children to find a spot in which to sit alone and observe silently. I asked them to record their observations through drawings and sensory-rich words. The children named these times “Sit-Sees,” and were surprised by how their ability to observe silently increased from a minute in September to ten minutes by December.

**Sharing the observations**

Upon returning to the classroom, we would meet as a whole group to debrief and share observations. We recorded sensory-rich words into a classroom word bank. During the weeks that followed, the children became skilled observers, noting even minute changes on the trail.

These explorations led to questions about the inhabitants of our local wild community. Using field guides, we began to look for evidence of animal life. Outside our window, we were able to graph and record the daily visitors to our bird feeders. Some, like the gregarious chickadee and chattering red squirrel, were obvious. Seed piles, scat, and tracks on the nature trail gave the students clues to our more secretive neighbors. Children found valuable information in books on native species.

Seasonal changes led to concerned questions such as, “How could these animals survive the harsh, New Hampshire winter?” Through our readings we learned that there were two types of adaptations, behavioral and physical.
New Hampshire Fish and Game provided educational kits that contained hands-on explorations of mammal life. Along with suggested activities, these kits included valuable resources ranging from actual furs to tracking molds. When the children were able to research a New Hampshire mammal of their choice, they were completely invested in the study.

Integrating subjects

During the weeks that followed, I was able to weave key concepts and skills from our unit of study throughout each day. For our Literacy Block, children read about mammals in a wide variety of genres. They learned how to organize and write reports with topic sentences and paragraphs. In writer’s workshop, they created first-person (mammal) diaries, menus, various types of poetry, and fables. We expanded the nature trail word bank to include “animal action” words such as skitter, slink and waddle. I observed how their writing was enhanced by the inclusion of the rich language gathered through trail explorations and classroom extensions. As an afternoon energizer, children acted out definitions of verbs or stories about their animal.

Students also developed math skills during trail activities. When the children excitedly discovered tracks, I taught them the three “P’s” of tracking: Print (size and shape), Place (location), and Pattern. The children learned to identify the pattern (waddler, hopper, walker, or leaper) and measure both the size and distance. They measured and created a graph displaying the dramatic difference in the lengths of the strides of New Hampshire mammals, including the observation that the four-inch white-tailed mouse is greatly shorter than the nine-foot-long moose. They would attempt eagerly to solve any word problem that included references to our outdoor explorations.

I was also able to integrate social studies and science. During their research projects, the children honed their mapping skills by identifying the ranges of their animals. We made comparisons of the different types of community ranging from the classroom and natural community up to the national level. Throughout this unit of study we also explored key concepts in the studies of adaptations, classifications, habitats, and food chains. We adorned the word banks in our room with key science and social studies vocabularies.

The promise of a showcase night also inspired my students’ engagement and motivation. When we discussed the idea of an audience, we set standards on how to create quality products. They initially had a concern about public speaking. We devised some strategies to build confidence. They practiced individually on a tape recorder, with each other, then in front of a group. By the time Marvelous Mammal Night arrived, the children had thoroughly prepared.

What can we study next?

After the presentations, parents repeatedly commented on how the children were both confident and poised. They were astonished at how much these young “experts” had accomplished. During meeting time the next day, the students shared their excitement and pride. I was especially impressed with their eagerness to begin another unit of exploration. I repeatedly heard, “What can we study next?”

Like most classroom teachers, I am continually searching for ways to enhance student learning. Twenty years of teach-
ing have taught me the value of outdoor or place-based learning. I’ve observed first-hand how this type of learning experience can positively impact all of my students’ learning, across curricular disciplines.

Multiple forms of assessment, from standardized to performance-based, also support my observations: for example, I had observed in the past that my students would often do better on reading tests that were fiction based. Since I have incorporated environmental activities, I have seen an increase in their ability to comprehend non-fiction texts. The questions my students expressed on the trail and during debriefing sessions led us to information sources that were often above grade level. The children worked hard at deciphering the words that would tell them what they wanted to know. I have seen a steady gain on their reading benchmarks (tests for assessing reading levels), especially in the genre of non-fiction.

Outdoor learning activities provide a cross-training for other curricular areas. When children learn to pay attention to details and specifics, they can bring that attention to other areas, for example, noting a decimal point or adding details to a story. Sensory rich observations give rise to enhanced verbal and written expression. Learning how to listen quietly is a valuable skill in a world that is too often chaotic and loud. When children learn the concept of niche, it helps them to understand their own unique role and value in a community. I have also observed that my junior naturalists are keenly aware of what we should do to keep our natural world clean and healthy.

Learning styles

Time and time again, I have seen students who have behavioral and learning issues become confident leaders on the trail. One child in particular comes to mind. He had encountered failure all the way through kindergarten and first grade. Early in the second grade year, he discovered a strange beetle while our class was “bug-hunting” outdoors. When he asked me what it was, I replied, “I don’t know, but I know where to look.” I pulled out an insect guide and together we found out what kind it was. Together we read the information. Back inside, he asked if he could “teach the class” all about it during our debriefing time. He showed his classmates the picture and slowly read the descriptive passage. Afterwards, he asked if I had any more guidebooks. When I showed him my shelf of nature books, his eyes grew wide and he gleefully announced, “This is the best day of my life.” This once reluctant reader could always be enticed by a nature book on critters.

During my early years at Gilford, I would use the trail on random occasions. Although Gilford is a rural area, I was surprised at how few of my children actually spent time outdoors. I loved being outdoors and wanted to share my enthusiasm with children, but didn’t really know how to connect the trail with our mandated curricular expectations. My pedagogical tool bag now includes activities from organizations such as Project Learning Tree and the grant funded CO-SEED (Community-based School Environmental Education program) from Antioch New England Graduate School. Both of the programs provided activities, resources, and training to ensure that relevant learning can take place all year long. Subsequently, I have been able to witness my own evolution and the dramatic difference that evolution has made in my work with students. I now use the outdoor environment as a valuable source for instruction where I can help my inspired students make relevant and meaningful connections.

Besides providing multiple opportunities for cross-disciplinary and differentiated instruction, outdoor explorations help children create a valuable personal relationship with the world around them. Alan McIntyre, an environmental and CO-SEED teacher from the local Audubon Center once said to me, “If you provide a child with a sense of place, you help them to build a sense of self.” In our demanding, fast-paced, changing world, we all need to feel a sense of place. I am completely convinced that the time we spend in natural explorations can help build vital connections for both our students and for ourselves.

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A Week in the Woods, by Andrew Clements (Simon and Schuster, 2004), is an exciting chapter book about a fifth-grade boy’s adventures and self-discovery. The son of wealthy and somewhat absent parents, Mark Chelmsley makes the difficult move to a rural New Hampshire school from Scarsdale, New York. One of his teachers, Mr. Maxwell (organizer of the annual “A Week in the Woods” school retreat), is somewhat vexed by Mark’s apathy and attitude. Outside of school, Mark is a bright boy with a newfound love of the natural world and he teaches himself about the outdoors. During the Week in the Woods program, a few turns of the plot find him challenged by issues of courage, perspective, and forgiveness. The author’s well-crafted writing of the change in Mark’s personality, as well as the change in the relationship between Mark and Mr. Maxwell, offer lots of opportunities for exploration. Much information about science and survival is included. References to the stories of Jack London help to make a link to literature.

Nature in the Neighborhood, by Gordon Morrison (Houghton Mifflin Company, 2004), is a fantastic book that encourages observation and wonder. Whether in urban, suburban, or rural environments, the species of birds, insects, and plants included as examples will be familiar to many. This natural history picture book for K through fifth-grade readers follows the seasons from early spring through winter. It describes phenomena and organisms in relation to one another, and specifically refers to the interconnectedness of species, weather, and environment. The wonderful illustrations offer detailed and accurate portraits of birds, plants, and animals. This book includes lots of information, both in words and pictures, including sidebars with small black and white illustrations.

Crawdad Creek, by Scott Russell Sanders (National Geographic Society, 1999), is a beautifully written book with equally beautiful illustrations by Robert Hynes. In a note to readers the author explains, “I wrote (this) in hopes of inviting today’s children to go outside, hunt for moving water, open their eyes and hearts and ears to the wildness that wells up everywhere.” This book conveys the world of the child, or through the child, even though the language seems well above the poetry and poignancy we would expect from children. It tells of the explorations of a brother and sister, panning for gold, noting the seasons, following animal tracks and sign, appreciating the diversity of wildlife, and listening to the creek as it “talks.” While the text relates the background of parental guidance, encouragement, and knowledge shared with children, the illustrations are gloriously lacking in parental presence. This is an inspirational book.

One Small Place in a Tree, by Barbara Brenner (Harper Collins Publishers, 2004), is a great example of the life of a tree and all the beings who depend on it. Beginning with scratches in tree bark, perhaps made by a bear sharpening her claws, this book tells the story of all the animals and creatures who make the tree their home. From drill-holes left behind by insects, the holes are enlarged by woodpeckers, and eventually become home to squirrels, songbirds, and
tree frogs. Once the tree dies and falls, other species move in. “Living trees are important. But so are dead and dying trees.” Simple language and stylized illustrations by Tom Leonard make this an easy-to-understand book for young forest explorers.

_Around One Cactus: Owls, Bats and Leaping Rats_, by Anthony D. Fredericks (Dawn Publications, 2003), is a picture book that introduces readers to some of the creatures who make their homes in and around the saguaro cactus. The rhyming text follows the pattern and rhythm of The House That Jack Built. Watercolor-like illustrations by Jennifer DiRubbio portray the creatures in a dream-like way, showing surrounding flora. A “field notes” section after the text offers more factual information about each creature. This is a delightful book for children ages five through eight.

_Girls Who Looked Under Rocks: The Lives of Six Pioneering Naturalists_, by Jeannine Atkins (Dawn Publications 2000), is an early chapter book that features biographies of six women: Maria Sibylla Merian, who, in 1699 traveled to South America to learn about beetles, butterflies, and spiders; Anna Botsford Comstock, whose work led to the inclusion of nature study in schools; Frances Hammerstrom, who gave up a career as a model to be a field biologist; Miriam Rothschild, an entomologist; Rachel Carson, whose seminal work _Silent Spring_ advocates for minimizing pesticide use and keeping the balance of nature; and Jane Goodall, who pioneered observing primates in their natural habitat and ultimately changed the way many biologists study their subjects. The author explains in the introduction that she chose women who, “sought beauty in unlikely places.” This is a great resource for young researchers and biographers.

_Were in the Wild? Camouflaged Creatures Concealed…and Revealed_, by David Schwartz and Yael Schy (Tricycle Press, 2007), is an attractive book that features stunning photographs by Dwight Kuhn. Each page spread has rhyming text with clues on the left, a photo of the creature in its habitat (camouflaged), and a foldout that shows where the creature is hiding. The foldout also contains factual information on the animal’s life cycle, eating habits, and points of interest. Species in different biomes and of different sizes are included, insects, fish, mammals, etc. This is a spectacular book for curious observers ages five through nine.

_Forest Explorer: A Life-Size Field Guide_, by Nic Bishop (Scholastic Press, 2004), is a large-format, early field guide of deciduous forests. Bright, life-sized photographs of many species have been collaged together using computer techniques. The result is rich, detailed images that allow the reader to find each critter as if searching for treasure. Seasons, times of day, and sections of the forest are explored through photos and informational text that precede each picture. This is a wonderful book to accompany any woodland study. It includes tips and projects, glossary, and a picture index. This is ideal for K through third-grade learners.
No Student Left Indoors: Creating a Field Guide to Your Schoolyard, by Jane Kirkland, is a complete guide for teachers of children ages five through thirteen and accompanies the “Take a Walk” series by the same author (which includes Take a City Nature Walk, Take a Backyard Bird Walk, Take a Walk with Butterflies and Dragonflies, etc.). Step-by-step instructions, guidelines, and encouragement are given for creating a field guide for your schoolyard. This author experienced a life-altering sighting of a bald eagle in the parking lot of a shopping plaza and she has been devoted to getting people to notice the natural world around them ever since. “Take a 20-second nature break every day!” she commands. The guide is quite thorough (it even addresses how to budget for the project) and is organized in a clear and attractive way. Highly adaptable to different regions and ages, this is an outstanding resource filled with excellent activities, resources, and information. Very detailed, it includes excerpts from teachers and experts. This guide is worth every penny.


Explore Spring! by Maxine Anderson, is one of a seasonal series with projects, activities, and experiments written for kids. Its comic-book format offers entry points on many levels. Facts, questions, and explanations pepper each page, accompanied by upbeat, goofy illustrations by Alexis Frederick-Frost. Trivia, jokes, and riddles are also included in these guides for six- to nine-year-olds. Sprouting seeds, fledging birds, and lengthening days are featured. Why do we have seasons? How do eggs turn into frogs? How do plants grow? Lots of fun activities are included. This would be a good resource for teachers to accompany other more thorough resources for springtime phenomena.


Go Outside! by Nancy Blakey, is a guide of over 130 activities in both rural and urban settings. Go for a sock walk, with a sock on the outside of your shoe, take it off when you get home and fill it with soil. Water it, and see what grows! Or, make some “Shadow Dance” paint—a combination of food coloring, powdered milk, and water—to paint your shadow on the sidewalk. Or, learn how to make an outdoor cooker and make eggs and biscuits for your breakfast. Whatever you do, just do it outside! The activities included cover a range of ages, seasons, and settings. Only some would be appropriate for school or to further curricular studies,
but all are fascinating and exciting ways to be outdoors. Photographs by Dana Dean Doering show a diverse group of children.


**Taking Inquiry Outdoors: Reading, Writing, and Science Beyond Classroom Walls**, by Barbara Bourne, is a very patient and useful collection of teachers’ writing about their work with children. “This is a book of reflections on children and learning; on teaching; on science made understandable through reading, writing, and hands-on investigations—all within the context of the outdoors.” After the author’s introduction, nine teacher-authors share their experiences. Teachers share candidly their successes and challenges by retelling what they have done outside the K–8 classroom. How to manage a group outdoors? How to address local and state standards while outdoors? Many helpful perspectives and ideas are included. A great way to support your own reflective practice and dedication to inquiry learning.


**How We Know What We Know About Our Changing Climate**, by Lynn Cherry and Gary Braasch, is a beautifully presented collection of factual stories about scientists and children around the world who are taking action to research and remedy climate change. Braasch’s earlier work, *Earth Under Fire*, inspired Cherry to collaborate on a book for younger people. Tracking monarch migrations, bird species, and the date of buds bursting are some of the ways in which students are helping climatologists. This is ultimately a hopeful book, developed to show what is happening, how we know, and what we can do about it. A section called, “What You—And A Million Kids—Can Do” lists many practical, simple choices and actions kids can take to make a difference. This is an excellent resource for grades five to eight. A teacher’s guide by Carol L. Malnor is also available from the same publisher.


**Schoolyard-Enhanced Learning: Using the Outdoors as an Instructional Tool, K–8**, by Herbert W. Broda, is a practical guide that begins by exploring some history and philosophy of environmental and place-based education. It suggests ways of enhancing the learning environment of the schoolyard, addressing topics like funding, community resources, and attracting wildlife. This book includes specific ideas for working with students, administration, and parents to generate support for outdoor learning. It examines sound practice such as planning ahead, efficient use of time, and spiraling back on curriculum in the classroom. Exemplary teachers share their experiences. This is a wonderful resource for the teacher needing encouragement to continue or initiate outdoor teaching and learning.


[http://natureskills.com](http://natureskills.com): A wilderness arts online journal. Home study courses, tracking, survival skills.

**Regional Nature Centers**: For an abundance of resources, find your local nature center by doing a Google search.
With the increasing availability of low-cost, high-quality digital cameras, it has never been easier to make them a valuable learning tool in your classroom. With ready and ongoing access to a camera, you can bring new dimensions to your outdoor investigations that, until a few years ago, were not possible. Gone are the days when a digital camera was a near-sacred asset that had to be checked out with special permission from the school office or media center. In this column I’ll share a few avenues to explore with your students. I’m sure there are many more that are great additions to your curriculum.

For your community investigations, digital photography is, of course, useful for documenting what you see. Since the pictures are essentially free and storage isn’t a major concern, there is no need to ration students’ photography like the days of film cameras or early digital cameras that stored only a few images on a floppy disk. With this freedom to shoot, students can gather freely and sort later.

A side benefit in this is the fact that you can use what they choose to shoot as a window into their thinking. For example, in the community investigations I led with a group of students last summer, I was struck by how much the students focused on graffiti and litter when the intended focus of the program was on urban ecology. Just because you say it in class doesn’t mean that they are focused on it in the field. With the benefit of this window on their thinking, I was able to refocus students’ attention and provide supplementary activities to extend their thinking in new directions—formative assessment at its best.

Digital cameras can help to document change over time, such as recording water levels in creeks.
Documenting change

A second application of digital photography that will enrich your curriculum is to record change over time. Since young students' attention span and memory can be elusive, having a record of events as they unfold can be a valuable teaching resource. Since the ecology center I direct is in a temperate zone, we have photographs of the same trees (shot from the same location) to illustrate seasonal change. Likewise, we have documented various stages of the creek that runs through the property. While we can discuss floodplains and show graphs of data from the U.S. Geological Survey gauge mounted where the creek leaves the center, the visual impact of seeing images of their study site under water adds a powerful and memorable component to the lesson. The applications unique to your site will be equally rich as you document plant growth, snowmelt, or a host of other natural phenomena.

As communication

When it comes time to share your pictures, the plethora of low-cost photo sharing sites now available makes it easy to share your field investigations with parents and others. If you work collaboratively with the class to create the posting, you can help the kids to integrate their learning as they tell the story of their work.

Since many parents' work schedules prohibit them from accompanying you on a field study, posting pictures helps to illustrate what the class is doing in a much richer fashion than you can achieve in a newsletter column. Looking further, photos posted online can be shared with grandparents and other potentially distant relatives, promoting much-needed intergenerational communication. At a time when schools are sharply limiting field exploration, you need all the support you can muster for students having authentic, community-based experience as the core of their learning. Well-structured photo projects can help to support the increasingly radical idea that students can learn outside of a classroom and away from pre-approved texts.

A final consideration for slightly more advanced users is to attach locations to your pictures through geotagging. While this sounds quite technical, geotagging is simply a process by which you assign geographic coordinates (latitude and longitude) to where the picture was taken. Practically speaking, this means that photos of your different study sites along a creek, or of key sites in different parts of town can be geotagged to maintain their reference to a specific location. Until recently, this required an expensive camera with a GPS (Global Positioning System) receiver either built in to the camera or added through an accessory slot. Now instead of using a $1,000 camera (which is likely to discourage you from giving kids free use of it), this same process can be completed—by students—with a free program like Geotagger (http://www.craig.stanton.net.nz/software/Geotagger.html) for Apple users or Panorado Flyer (http://www.panorado.com) for Windows users.

Throughout your fieldwork, bringing out the visual dimension though creative use of digital photography enhances the experience for everyone, and provides an essential component for your visual learners. This can only improve your image as a teacher!

Bob Coulter is director of Mapping the Environment, a program at the Missouri Botanical Garden’s Litzsinger Road Ecology Center that supports teachers’ efforts to enhance their science curriculum through use of the Internet and Geographic Information Systems (GIS) software. Previously, Bob taught elementary grades for 12 years. bob.coulter@mobot.org

In a temperate climate, seasonal changes become obvious in pictures of trees taken from the same place at different times.
Friends’ School is an elementary school in Boulder, Colorado. It sits just east of the base of the Rocky Mountains and at the edge of the plains. We do our best to celebrate the natural world, in part through our celebrations of the change in seasons and with daily rituals. What follows are two accounts by teachers of how we make nature an integral part of each child’s school life.

DIANE BRAMBLE

Sweet Tree
by Soren
Sweet tree,
live long.
Now go to sleep and
whistle to me next time.
Tree, sweet tree,
live long.

How did this tree, this unassuming quaking aspen tree, standing barely a foot taller than the eight-year-old poet who’s memorializing it, become the object of such affection and celebration? This is the tale of how each child in my second-grade class falls in love with nature, one spindly tree at a time, while also increasing their knowledge base and lifelong respect for the natural world.

The trail over time

On the last Monday of every month, we leave the confines of the classroom and head for open space at the Bobolink Trail. The children are energetic, expectant, and engaged. We spend our morning messing about, exploring, observing, connecting to ourselves and to the earth, learning about the intricacies of the ecosystem where we hike, and then making entries in our field journals.

We always begin by forming a circle at the trailhead to pause, center ourselves, and tune in to the rhythm of the outdoors. We read the Watcher’s Promise from *The Wild Watch Book* and mean every word—

*I promise to respect all animals and plants. They have a right to live. If I borrow animals from their homes to study, I will return them safely where they belong. I promise to protect all habitat; wildlife depends on it for survival. I will leave wild places as I find them. I will take only my memories home.*

In our circle, we pass around a Cottonwood leaf as a talking piece. Before the children head into the field and visit their special tree, we want everyone to tune in to his or her senses. We do that by having a quick sharing of what the children have noticed in just the few minutes of being at the trail. Here are some of their responses:

- The sun feels warm on my skin;
- I just heard a Chickadee call;
- The ice has melted so the creek is running again—the water is so cold!
- There are buds on the trees now;
- I see cumulus clouds;
- I think those are fox tracks by that fencepost!

David Sobel posits that we have to allow children to love the Earth before we ask them to save it. That’s one of the stealthy purposes of our monthly Bobolink trail hikes. We are placing the world into these tiny, curious hands and every time
a new fact is learned, a sense of place is strengthened, and these children, these keepers of the Earth, assume their mantle with exceeding grace.

Respecting each learner

When I first started teaching I believed the key to being an effective teacher was to love each child deeply. I quickly realized that love wasn’t enough, there had to be something more. As I gained life and teaching experience, I realized that that something more was a deep and unwavering respect for the child. By making this shift in intention I could make decisions regarding teaching, curriculum, and behavior management with increased ease and certainty.

For me as an educator, it’s a balance of leading with both the head and with the heart. I believe that many young children have a similar epiphany as they mature. They begin their lives with an automatic love of nature; they are intimate with ants, enamored of the moon, and bewitched by butterflies. This love is immediate and purposeful. The natural world is a first teacher to children. We classroom teachers, those who are next in the pedagogical line, need to continue guiding the children toward their first love—nature, but we also need to guide the children toward that something more—a deep and abiding respect for nature.

Back at the trail, the sharing circle concludes and everyone walks along the path next to the South Boulder Creek. We’re headed toward the forested area where each child has a special tree to visit. Soren and I fall into step with each other and he says, “What I like most about coming to the Bobolink Trail is that it’s a quiet place where you can just sit and everything else doesn’t matter.” A few more thoughtful steps later he adds, “I wonder what Sweet Tree will have to say to me this time.”

Soren and his classmates have studied many aspects of trees, from phloem to taproot, and yet what lingers longest is each child’s personal connection to these living, breathing entities. Through expressing the connection they have developed with their trees, the children learn that they are writers, that they have something important to say, and that they can find a way to say it, with eloquence and with insight. The children demonstrate their interest, respect, and appreciation for the trees by conducting informal scientific investigations: they observe, touch, ponder, test, and record.

Each child dashes to his or her tree to discover what has changed since the previous visit. There is a buzz of excitement as the children call from tree to tree with the news of fresh buds, beetle tracks in bark, broken branches, and bird nests. Gradually, the level of activity shifts and the air grows still. I do a quick scan and see all of the children leaning in close to their trees as if they’re paying attention to something. And when I lean in closer to understand what it is they’re all doing, I finally realize what it is—they are listening.

Lois Sandusky

Taking children outside for part of their education day is as important as feeding them good food—it nourishes them and exposes them to the miraculous. It softens their faces with reaction to real beauty. Their senses sharpen: “Listen to that!” they whisper as they hear the first birds at the end of the silent Colorado winter. “Feel this!” they demand as they touch the yellow-green tips of pine branches.

All around me the children are extra-alive, mega-charged with happiness. Their voices modulate to perfect sound—not too loud, not too soft. They are happy with
each other and, what is more, with themselves. This happiness manifests in their gait and in their facial expressions.

Last Friday I took my fifth-grade class outside for a special art, science, and writing class. Our destination, down the bike path which runs behind our school, was a vine-choked fence, just at the first turn in the bike path. We had visited this place right before the autumnal equinox last September to draw and paint the Virginia creeper vine, covered at that time of year with cobalt blue berries at the ends of the brightest lacquer-red stalks. Every year when I take my students there they are astonished at the beauty of these berries mingled in with the red leaves of the fall vine. They sit right down and work, without a sound, forgetting everything around them except the berries and their sketchbooks.

Outside, students have endless attention for this writing exercise. Afterwards they all want to share what they’ve written, much of it filled with science questions: “Why haven’t the birds eaten the berries?” “Are stems that red on any other plant?”

The workshop is a success—because it happened outside. It would have been a partial success inside: some students would not have joined in, almost always the case inside. But outside all are confident, all are working effortlessly. They are writing in the way the birds are now singing and in the way the vine takes the fence. They are the natural sketchers, writers, thinkers, and scientific questioners that human beings are.

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**Back to the vine**

I took the same students to the same place, right before the spring equinox, when they’ve been somewhat light deprived even in the sunny State of Colorado. It was one of those secret grand days of late February, before the last of the Colorado snowfall, and perfect for revisiting our vine. Outside for class again, it was as though someone had pressed a reset button on the squirrelly, mouthy fifth graders of winter. Their sense of well-being came back to normal, along with respect for their fellow human beings. We walked down the bike path toward our vine, to draw what we saw, to find out what we thought by writing. It was with excitement and curiosity that the students observed their vine gone brown and dormant with winter. Again, they were calling out to each other: “Look at the little spirals, the tendrils. They hold the vine onto the fence!” “See! The berries, some of them, are still here, black and hard. The birds never ate them.” “It’s still beautiful in another way.” Then they began to draw and write.

The following are excerpts from that writing day in nature:

Grant: Many a time harsh winters have blown their heartless bounty of wind and snow sanctified by sadness.

Izzy: The nature around me always makes me feel more safe and protected.

Haley: You are free as soon as you let your mind wander.

Shae: I am the sturdy ivy vine. Draping myself across a lamppost or a fence, my soul admits life into nooks and crannies. What I breathe out is good for all to breathe. Do not doubt my abilities if I can have a sturdy tree to climb on.
How can we assess what nature does for children? We observe them and take notes and keep a log of how they are different in the social/emotional realm as well as in the academic and artistic realm. We read their written reflections and note the attention, the length, the fluency, the energy, and the depth of their outside writing. And then we do what can only be done anecdotally, ethnographically—we note that their Area of Expertise papers (research that children do by choice) are, more often than not, about the natural world. We note the fullness of their interest in Earth Day and all the ways that they choose to care for Earth. We see them grow up to be scientists, writers, painters, mathematicians, all in love with nature. Observation skills, assessed through writing and drawing, will yield the best scientists, engineers, writers, parents, and citizens of the world.

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Resources


The Child’s Garden—Outdoors

The “outdoor kindergarten” is hardly a new idea: the first one was started by Ella Flautau in Denmark in the 1950s. Since that time, many others have begun, often based on the philosophies of Rudolf Steiner and Dr. Emmi Pikler. One example is the Green Valley School of Westminster, Vermont. Children ages infant through third grade attend and spend up to 80% of their time outdoors. Naps (for the youngers) are taken in a sleeping pavilion. One parent, Elizabeth Nieuwsma-Dell, shares her thoughts:

I began to think about some of the developmental skills that children work on at this age: manual dexterity, balance, categorizing, enumeration, and imagination, to name a few. These were all at work right there in the woods!

These children are learning impromptu, firsthand lessons about plant and animal life, seasons, weather, the concept of death and rebirth, the food chain, and much more. They are also beginning to develop an ecological awareness, and to see themselves as “a part of” nature rather than “apart from” it.

The knowledge they gain here is a part of their own life experience. This direct experience with nature provides an extraordinarily solid platform from which to learn more difficult concepts later in their education.

I think ahead to when my children are much further along in their education. They will already have an understanding of abstract concepts such as evaporation, reproduction, plant relationships, etc., because their brains will have already begun grasping these concepts while interacting so closely with nature in their early years. These kids are gaining so much more in the forest than they would from within four walls.