

# EXPERIENCES IN NATURE: RESOLUTE SECOND-PLANE DIRECTIONS TOWARD ERDKINDER

Gerard Leonard and Kathleen Allen

*Gerard Leonard and Kathleen Allen describe a variety of nature experiences as a part of the Montessori elementary tradition, beginning with a warning about the way contemporary life constrains children's experience of nature. Through a lyrical rendering of the nature-based expressions of children, Leonard and Allen look at a variety of approaches to nature study through the senses, the enrichment of gardening, daily journals of nature observations, poetry writing, bird watching, biographies of natural scientists, drawing, use of the microscope, and classification. Finally, they present a list of curriculum inclusions for the elementary, with concluding remarks summarizing the role and uniqueness of studying the "book of nature."*

*No matter what we touch, an atom or  
a cell, we cannot explain it without  
knowledge of the wide universe. (Maria  
Montessori, To Educate the Human  
Potential 6)*

And for this knowledge of the wide universe to take root, the child needs, in addition to hearing the inspiring great story of our cosmos and exposure to all the scientific disciplines, the experience of simple natural and timeless acts such as sowing seed, gathering the crops, and celebrating the bounty with friends.

*In Spring we planted seed,  
And by degrees the plants  
Grew, flowered, and transformed  
The light to food, which we  
Brought in, and ate, and lived.  
The year grown old, we gathered  
All that remained. We broke,  
Manured, prepared the ground  
For overwintering,  
And thus at last made clear  
Our little plot of time,  
Tropical for a while,  
Then temperate, then cold. (Berry 203)*

How children love to experience "the little plot of time," the round of the year, the seasonal growth

and decay. But more than just experience, they want to really feel part of nature's great circling. Maria Montessori's vision was that the children should "live in Nature."<sup>1</sup> She saw that children naturally revel in forest and field and stream, and want to be intimate with their kin, the Earth's creatures. And she came to believe more and more strongly, especially after the experiences she and her son Mario had with children living in nature in India, that a deep intimacy with the natural world was not only very healing for the child but prepared him well for the next plane of development, for his relationship to society, to the human family.

"Actually, nature frightens most people," wrote Maria Montessori in 1948, just a few years before her death and after some forty years of observing children and families worldwide. She continued: "They fear the air and the sun as if they were mortal enemies. They fear the frost at night as if it were a snake hidden in the grass. They fear the rain as if it were a fire" (*The Discovery of the Child* 70). This has certainly not changed in the sixty years since these words were written; rather, the fear has been compounded over the last several generations to where we can easily accept Richard Louv's portrayal in *Last Child in the Woods* as a most believable warning of where we are heading.

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<sup>1</sup>In *The Discovery of the Child*, a brilliant chapter titled "Nature in Education," Maria Montessori elaborates on this idea beautifully and with a practicality clearly based on lived experience with children.



Art from *De Natuur in de Amsterdamsche Montessori School*, A.F.J. Portielje and R. Joosten-Chotzen, Amsterdam, 1932, courtesy of Leonard/Allen collection

Renilde Montessori is very direct when it comes to this question of our fears. She says in her book *Educateurs sans Frontières*: “Where our children are concerned, it is our bounded duty to corral our fears, look at them dispassionately, sort and classify them and use them as the guiding element they are rather than letting them stampede and overrun us” (47). The elementary years are a time of boundless energy, strength, and, yes, fearlessness. This we know from observations all over the world, and this we know from memories of our own childhoods.

Listen for a moment to just a taste of what we are missing if we continue to wall off ourselves and our children from nature. Being in nature, observing closely and patiently, invariably elicits a special kind of writing, and this seems to be particularly accessible to children. Here are a few pieces to ponder, all deriving from being in nature and simply looking:

The monarch sits quietly, perched upon a nearby flower. He is probably the last of his kind before the incoming frost. The wind blows cool in my face. I know it’s coming ... fall.

He opens his colorful wings and leaps gracefully from one flower to the next. His wings glint against the sun and he flies away. He soars elegantly in the September wind, lands and finishes up with a flutter of his delicate wings. He is beautiful, his warm colors make me want to smile ... a warm hug, a toasty fire, a soft blanket and a hot piping cup of hot chocolate with marshmallows..... mmmm! He flies away ... never to be seen again by my eye. (Julia, age eleven)

“The Crows!”

The crows, here they come, darting to the ground.

The crows, the crows, they’re everywhere,

The crows, on the ground, walking all around,

The crows, the crows, they’re everywhere.

Here more come, in the air,

The crows, the crows, they’re everywhere. (Zeke, age eight)

The following writing is excerpted from a longer piece where the girl observes a tree she had previously observed and written about in a different season:

I smooth out my page. I only have so much time, but I don’t want to rush. I just want to enjoy my beautiful friend and its surroundings. My tree shades me with its winding trunk, stretching into branches with leaves, a juicy-green sparkle. My tree’s roots pop out of the ground just like a mole popping out of a certain hole in a million. Birds are chirping sweetly in my wonderland. Pine needles scatter the ground at my motionless feet. I hug my warm chunky textured tree, I feel moved, well, wouldn’t you hugging one of your best friends? I love my tree and always will forever. (Emma, age nine)

In our work with elementary-aged children we never cease to be amazed by how much they absolutely love animals and plants. Their thirst for both knowledge of and real connection to every kind of animal and plant is pretty inexhaustible. One could create an entire curriculum around nature study, and the children would be endlessly fully engaged. In fact that’s what our cosmic plan is, deeply connecting with mind and heart to our world and its life. We just have to work hard against the pervasive



cultural pathology that disconnects children from nature. We must not simply stay indoors with our timelines and classified nomenclature, as wonderful and attractive as they are to the children.

A child can enter the disciplines of botany and entomology with vigor and great intelligence, but first he must be familiar with one particular tree and with the ways of one tiny “six-footed” little ant: “If we study, for example, the life of plants or insects in nature, we more or less get the idea of the life of all plants or insects in the world. There is no one person who knows all the plants; it is enough to see one pine to be able to imagine how all the other pines live” (Montessori, *From Childhood to Adolescence* 35).

For this epiphany of connecting the one to the many, the child needs to be often in the garden, feeding the domestic animals, assiduously caring for the wild birds in winter, exploring in the woods, fishing with a net in a vernal pool, climbing a hill or even a mountain, lying on the grass under the stars watching the Perseids shooting across the sky every

August. “How often is the soul of man—especially that of the child—deprived because one does not put him in contact with nature” (35).

Our children have to encounter nature on multiple levels. First of all and most importantly, the encounter is through the senses, by sight, by touch, via sound, and kinesthetically. This begins with great intensity before age six but the immersion in the colors, tastes, songs, and exploration of the natural world must continue to be deepened during the elementary years. Emotional experiences are essential. Feelings of real affection, of caring for other living beings, emotions of tenderness, gratitude, and wonder in the face of nature’s ways are a treasure house not to be missed during childhood. And lastly, and most powerfully during the elementary years, the encounter is via the intellectual disciplines, through biology, biogeochemistry, taxonomy. All of these disciplines are woven through the elementary years such that Earth’s history and the interconnections of geology and biology are unveiled, and the wonderful tapestry of living forms is presented as an intelligible system of classification.



Courtesy of Vanessa Toinet, Ecole Montessori du Morvan, Bard-le-Regulier, Burgundy, France



So first of all it is essential that our children get their hands in the soil, in the “good clean dirt,” as grandmother used to say. Our children have to learn gardening, the whole of gardening, from preparing the ground for the seed, to harvest and the further preparations for the next cycle. This is so vitally important because this experience is the most direct way for a child to access the laws of nature, to participate in nature’s mysteries, and to make both a heart connection and a nascent scientific observer’s awakening to plants, insects, animals, fungi, water, sunlight, and so on. We have watched children keeping a daily nature journal of their observations of different seeds as they sprout and grow. A deep kinship with the plants being studied and cared for is developed, not to mention the incredible refinement of the powers of observation and the patient waiting that is fostered. Children are born naturalists, and not surprisingly the lives, diaries, and drawings of the great historical and contemporary naturalists

are a real inspiration and source of much interest for them as they pursue this work.

There is so much to see in a well cultivated garden. J. Henri Fabre, the great French entomologist so admired by Maria Montessori, did most of his classic observations of spiders, caterpillars, bees, and other insects in field and garden. Unbroken time, patience, a writing journal, a sketchpad, and a hand lens are the indispensable tools. Daily access is also vitally important. For in Fabre’s own words regarding his observations of garden spiders, “What I did not see very plainly yesterday I can see the next day, under better conditions, and so on any of the following days, until the phenomenon under observation is revealed in all its clearness” (231).

And “the child, who more than anyone else is a spontaneous observer of nature, certainly needs to have at his disposal material upon which he can



Courtesy of Mr. Katsuhiko Yorita, Information Center, Okinawa, Japan, submitted by Takako Fukatsu

work” (Montessori, *The Discovery of the Child* 73). These materials are plants, flowers, herbs, and domestic animals to care for.

Maria Montessori’s very first Casa in Rome (1907) had a cultivated garden in the adjoining courtyard and little plots for each child to grow and care for plants. The first Casa in Milan (1908) had little houses for animals in the courtyard. In *The Montessori Method* (1912) she wrote of how the keeping of the little gardens was not only a part of the transformation of the children but also of the social reform of the surrounding community of adults. She mentions Lucy Latter, the British educator and horticulturalist, whose book *School Gardening for Little Children* had such a wide influence. Nature in education and its wider social ramifications was very much in the forefront of her mind.

Think of all the wonderful experiences that come from “living” in the garden over many months and years: preparing for planting, planting the seeds or seedlings, weeding, fertilizing, composting, watering, protecting the plants, cultivating, propagating, harvesting, learning preservation and storage methods, putting the garden to rest for winter. And think of how the disciplines of botany and soil science are experienced in such a deeper way when the garden (or greenhouse in a cold climate) is an integral part of the daily prepared environment of the Montessori classroom.

“The most pleasant work for children is not sowing, but reaping, a work, we all know, that is no less exacting than the former. It may even be said that it is the harvest which intensifies an interest in sowing” (Montessori, *The Discovery of the Child* 75). We have often seen the great joy when children, for example, harvest all the lettuces in the garden and create wonderful salads for themselves and their families. They love to celebrate their work and nature’s bounty.

Maria Montessori considered the garden so important that she wrote: “plans for a garden run parallel with those for the building of a Children’s House” (*The Discovery of the Child* 78). It was really inconceivable to her that a prepared environment for children could exist without a garden.

We also have to remember that the sensorial encounter, the “living in nature” must occur in non-



Courtesy of Mi Casita Montessori, Quetzaltenango, Guatemala

cultivated environments, especially in woodland, field, and stream. Free play outdoors is so essential and the precious time to build forts, dams, miniature villages, and so on. Every six- to twelve-year-old thirsts to do these things. Unfortunately, more and more children in the “developed” world are not being given the time, freedom, or environments where they can do these things. The tendency to “improve” or “landscape” every inch of school properties and in so doing eliminate any spot of wasteland or semi-wild woodland is something to be monitored if we are to be advocates for the child’s right to explore the natural world. Of the forest Dr. Montessori eloquently wrote:

There is no description, no image in any book that is capable of replacing the sight of real trees, and the life to be found around them, in a real forest. Something emanates from those trees which speaks to the soul, something no book, no museum is capable of giving. The wood reveals that it is not only the trees that exist, but a whole, inter-related collection of lives. (*From Childhood to Adolescence* 35)

Certainly, here is poetry and truth, and we might say an admonition to us: Can we say that the child at age twelve has really “lived in nature” during the



critical first- and second-plane years? If the answer is yes, one can then begin to imagine how this child, grounded in his natural world, is prepared to be the “Erdkind” of the third plane of development, eager to work out the societal adaptations needed for his time, place, and circumstances.

In order to more fully embody nature and the biological sciences, children also need to see and hear of examples of people throughout history who were inspired by nature. They need to know of the writers, artists, and composers who drew upon the natural world for their work. It is important to read to them examples from writers such as Wendell Berry, Annie Dillard, Mary Oliver, and Edwin Way Teale.

To glimpse the intensity of this relationship to nature and to inspire creativity in composing nature poetry, read this poem by Mary Oliver to your children:

“Of What Surrounds Me”  
Whatever it is I am saying, I always  
need a leaf or a flower, if not an  
entire field. As for the sky, I am so wildly  
in love with each day’s inventions, cool blue  
or cat gray or full  
of the ships of clouds, I simply can’t  
say whatever it is I am saying without  
at least one skyful. That leaves water, a  
creek or a well, river or ocean, it has to be  
there. For the heart to be there. For the pen  
to be poised. For the idea to come. (32)

These words are simple and deep, but clear enough for an older elementary child to grasp.

Other areas of creative endeavor in which one can explore nature themes include art, music, dance, and drama. Study the nature-based art of Jean-François Millet, John Constable, Claude Monet, and Georgia O’Keeffe. Listen to nature-related music by composers such as Antonio Vivaldi in the visually descriptive piece *The Goldfinch*; and Georg Frideric Handel’s *The Cuckoo and the Nightingale*. An interesting footnote to this would be the work of Dr. Tony Phillips at State University of New York at Stony Brook. Dr. Phillips, a professor of mathematics, has been analyzing native bird songs, slowing down the sound, playing these pieces on the piano, and

notating the songs. These are fascinating pieces to play on the tone bars.<sup>2</sup>

Elementary children need to hear the stories of the natural scientists throughout history, both the well-known and lesser known. Figures such as Charles Darwin, Jane Goodall, Carolus Linnaeus, Rachel Carson, George Washington Carver, Gregor Mendel, and Anton van Leeuwenhoek are definitely on the list. There are many others, especially those that inspired Dr. Montessori, such as J. Henri Fabre and Ernst Haeckel, or those of the American nature-study and conservation movements of the late nineteenth and early twentieth centuries, such as John Muir, Liberty Hyde Bailey, and Anna Botsford Comstock. During this time period there was written a wealth of literature for children and teachers. Notable examples include *Life and Her Children* by Arabella Buckley (1840-1929), published in 1880. Buckley was the secretary of Sir Charles Lyell, geologist, and a friend of Charles Darwin. Her many books for children are deeply grounded in evolutionary theory and portray the classification of animals as understood at the time. It is important to have had exposure to these heroes of biology and nature study, to have heard of their particular life-changing experiences, and to experience their original words and feel how the soul is stirred, nourished, and inspired by such writing.

Drawing is an essential experience that supports children in their developing powers of observation. Children must record what they see in the natural world by illustration (and composition). Dr. Montessori identified this need for children to experience themselves as observer/illustrators. After the beginning work with geometry, she experimented with having the children draw geometric designs, using rulers, compasses, protractors, squares, and pen and ink. All the geometric figures were reproduced as designs and gathered into a portfolio. Thus, not only did the children acquire a deep understanding of the geometric forms, they developed coordination and hand-eye skills that laid the foundation for further work in drawing. “To confer the gift of drawing we must create an eye that sees, a hand that obeys, a soul that feels; and on this task the whole life must cooperate. In this sense life itself is the only preparation for drawing. Once we have lived, the inner spark of vision does the rest” (Montessori,

<sup>2</sup>See <http://www.math.sunysb.edu/~tony/birds/music/index.html>. Children can listen to bird songs and begin to train their ears in this way, as well as with the Montessori bells.



Courtesy of Erin DeVries, Annie Fisher Montessori Magnet School, Hartford, Connecticut

*The Advanced Montessori Method—The Montessori Elementary Material* 309).

When the children had practiced these geometric exercises for a while, she then introduced opportunities for observation in nature:

The observation of nature (flowers and their different parts—pollen, leaves, a section of some part observed under the microscope, plant seeds, shells, etc.) serves to nourish the child’s aesthetic imagination. The children also have access to artistic designs, collections of photographs reproducing the great masterpieces, and Haeckel’s famous work *Nature’s Artistic Forms*, all of which equipment is so interesting and delightful to a child. (303)

The work with natural objects was a perfect next step for the drawing experience, and the children began to enjoy simple botanical dissections and working with microscopes: After carefully dis-

secting and identifying the parts of a violet, “with great joy they began to draw them; and they were accurate, skilled, tireless, and patient, as they are in everything else” (313-314).

This type of work is the same done by great researchers and naturalists in the field. Jane Goodall has kept meticulous notes and sketches as she studied the chimpanzees in Gombe Stream National Park in Tanzania over a period of forty-five years.<sup>3</sup>

Children are innately drawn to illustrate what they see in nature. They employ pen and ink and watercolors with ease, if the environment is prepared for this. These exercises have to be offered as a regular work in the class, just like grammar and multiplication, not as a specialty that occurs periodically.

There must be time, especially quiet, reflective time, in nature, in the garden, or studying the

<sup>3</sup>See an image of Dr. Goodall and a sample page from her notebooks at this site: <http://bio1151.nicerweb.com/Locked/media/ch01/inductive.html>.





Courtesy of Brad Bachulis

aquarium. This sacred time in the natural world to draw what is seen, as well as to write about it, leads to the “eye that sees ... a soul that feels.”

Our approach to the discipline of biology is based on the child’s psychology, on his growing interests throughout the first and second planes of development. There is a building up of substantive knowledge of the discipline in a systematic way. Knowledge of the anatomy and physiology of the major phyla is gradually acquired together with a comprehensive taxonomic scheme. The scientific nomenclature is introduced over a nine-year period. The understanding of biology is, in the Montessori elementary classroom, always related to the timeline of life and the emerging story of the evolution of life on Earth. The maintenance and history of the Earth’s atmosphere, hydrosphere, and lithosphere through the work of Earth’s living creatures is a unique aspect of our elementary science. In addition, the elementary child is offered a fundamental understanding of the nature and role of the key elements of carbon, hydrogen, oxygen, nitrogen, and a vision of the great global cycling of water, carbon, and nitrogen.

As Montessori educators, we must stay current in our knowledge of the sciences. We must read, discuss with colleagues, and support our classroom environments as lively, stimulating laboratories. For example, Richard Dawkins’ *The Ancestor’s Tale* takes a different look at the evolution of life. Dawkins moves from the present back into the past, noting each important event of evolution along the way.

He calls these “rendezvous points,” where we meet a “concestor,” our most recent common ancestor. He tells the tale in the spirit of Chaucer’s *Canterbury Tales*. Many of these stories are perfect little fables to inspire thought and further research among elementary students. For example, “The Hippo’s Tale,” which is also “The Whale’s Tale,” tells how we now know that both hippopotami and cetaceans, closely related, are descendants of land mammals. In classification, the super-order Cetartiodactyla includes cetaceans (whales, dolphins, etc.) and the artiodactyls (even-toed ungulates: hippos, deer, etc.). Every tale in this book can become a point of interest for the Timeline of Life.

In order to be ready for the third-plane life sciences, Montessori elementary students need the following real experiences and knowledge base:

- Experiences in the field with real nature
- Ability to identify the common native plants and animals of their region
- Familiarity with domesticated plants and animals
- Ecology and relationships among the organic and inorganic
- Taxonomy and its current nomenclature (e.g. Cnidaria in place of the old term Coelenterata)
- All current organizing principles, such as Domains and Kingdoms, not a simple plant/animal dichotomy
- The anatomy, physiology, and main characteristics of the Domains and Kingdoms
- Deep understanding of the Timeline of Life, including the life forms of the Pre-Cambrian
- A clear introduction to the Bacteria and Protists in the later years of the elementary—we must move from the seen to the unseen (microscope work is essential here, as is a real laboratory experience)



- The study of cells—Prokaryotes and Eukaryotes, animal and plant, basic knowledge of organelles and cellular processes
- A simple understanding of biochemistry

Biology must be intimately connected with history and geography. We are fortunate as Montessori educators that we are shown a systematic plan for biology as part of our training. Look through any commonly used high school biology text, such as Campbell and Reese's *Biology: AP Edition*. Here you will note the main unit headings:

- The Chemistry of Life
- The Cell
- Genetics
- Mechanics of Evolution
- The Evolutionary History of Biological Diversity
- Plant Form and Function
- Animal Form and Function
- Ecology

These are the worlds to open to the elementary student, not a detailed study, but an introduction to these concepts, planting the seed. All of these topics should be introduced during the elementary years and most are already represented in our classroom materials. One large area of biology study that may not be as developed is the study of the cell. Just as we present the golden bead unit as the basic building block of mathematics and the letters as the basic unit of language, so we must present the cell as life's fundamental unit of structure and function.

Now let us return to experiences in nature, for these are the bedrock upon which the aesthetic and intellectual work is founded. Dr. Montessori writes of five gradations of ascent in the study of nature. It starts out with the child's being initiated into the world of just observing the phenomena of

life. Next, he is initiated into foresight—he knows that the life of the plants and animals he cares for depend on his diligence. Third, patience and “confident expectation” awaken, a form of faith or philosophy of life. Fourth, a feeling for nature's marvels develops, and finally, she notes: “The child follows the natural way of development of the human race” (*The Montessori Method* 156).

We can understand her words well if we put them in the context of the nature-study movement of the time. The nature-study movement began in the United States in the late nineteenth century and continued into the early twentieth century. Its purpose was to introduce children to the natural world in a way that was practical, spiritual, aesthetic, and scientific. The movement was closely linked to the budding conservation movement. Its roots lay in the philosophy of Jean-Jacques Rousseau and Louis Agassiz. Cornell University became the center of nature-study with professors Liberty Hyde Bailey (1858-1954) and Anna Botsford Comstock (1854-1930) as prominent leaders.

The following words of Professor Bailey echo Dr. Montessori's faith in nature as central in education: “The light, the dark, the moon, the cloud, the rain, the wind, the falling leaf, the fly, the bouquet, the bird, the cockroach—they are all ours. If one is to be happy, he must be in sympathy with common things. He must live in harmony with his environment” (31).

Anna Botsford Comstock, the author of the *Cornell Nature Study Leaflets*, was a scientist-illustrator of renown. Her famous book *Handbook of Nature Study* (1911) is still in print today and is a great resource for teachers.<sup>4</sup> Both Professor Bailey's and Professor Comstock's desire was to cultivate in the child a love of the outdoor environment, a love of beauty in nature, and an ability to observe simple, common natural things. Such experiences would, they believed, truly develop the child. Their approach was to follow the child's interests, not the subject matter. Dr. Montessori combined this approach with a parallel intellectual study and presented them as complementary and as both necessary for a deep understanding of our natural world.

<sup>4</sup>Anna Botsford Comstock was the first college professor to actually take her students outside to study nature. Her scientific illustrations, particularly wood-engravings of insects, were exhibited nationally. In 1894 she established the nature study curriculum in New York public schools. She was also elected to the National Wildlife Federation's Conservation Hall of Fame in 1988. Both her life story and her beautiful drawings are worth sharing with children.

What we elementary Montessori teachers have to remember is that the real experiences in nature come first, and not only that, but they must continue to be the centerpiece of what we call Cosmic Education as we gradually grow the intellectual disciplines and introduce the scientific materials for exploration and development.

Lena Wikramaratne relates that in India, where the “cosmic plan” for the elementary years was fleshed out, that the guide indicated by Dr. Montessori was *The Book of Nature*:

Thus, with the guidance of Mario Montessori, there were rambles every day in the woods and meadows, up and down the rocks and slopes of waterfalls, crossing the brooks and fishing in the ponds, rowing to and fro in the lake, collecting beetles, butterflies and frogs eggs, baby lizards, etc. Each time was a lesson in geography, geology, biology ... every ramble became an “intellectual walk.” (30)

This constant grounding in nature is also for the teachers, not only for the children. In her Kodaikanal interview with David Kahn, Miss Wikramaratne said that the trainees “must go out into the natural world or else they won’t be able to show anything to the child” (50).

And Dr. Montessori would have us prepare thus:

I would therefore initiate teachers into the observation of the most simple forms of living things, with all those aids which science gives; I would make them microscopists; I would give them a knowledge of the cultivation of plants and train them to observe their physiology; I would direct their observation to insects, and would make them study the general laws of biology. And I would not have them concerned with theory alone, but would encourage them to work independently in laboratories and in the bosom of free Nature. (*The Advanced Montessori Method – Spontaneous Activity in Education* 138)

So let us corral our own fears and feel comfortable in the bosom of nature. Let us become naturalists with our own journals and sketchpads and enjoy sauntering forth in nature, and exploring with our own hand lenses and microscopes. Let us grow herbs, plant fruit trees, and keep chickens or bees so that we may offer the children their birthright, the chance to deeply know and love their natural environment during the years before adolescence.



Courtesy of Rusty Keeler, [www.earthplay.net](http://www.earthplay.net)

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Gerard Leonard is AMI trained in Dublin at the primary and elementary levels. He has taught for over thirty years in primary, elementary, and adolescent classrooms. He is the program coordinator at The Cobb School Montessori in Simsbury, Connecticut and is in the AMI Elementary Training-of-Trainers Program. He is a member of the NAMTA board and serves on the advisory board of the Montessori Training Center of New England.

Kathleen Allen is AMI trained and has been teaching for more than forty years. Additionally, she conducts research and design in the field of classroom materials, including scientific illustrations, and is a key implementer of *The Keepers of Alexandria*. She currently teaches an upper elementary class at Hudson Country Montessori School (Danbury, CT) and is working towards a doctorate in history.

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