

Living Education

Problem Solving:

Cultivating a
Creative Mindset

In this issue:

Making Science Relevant with Authentic Inquiry

Embracing the Art of Journal Writing

Signature Thinking Framework

Hideaways for Outdoor Fun

Fostering Innovation

Nature Looms



**Oak
Meadow**

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Contents

- [4](#) ***Meet Me Halfway***
by Leah Massey

- [6](#) ***Signature Thinking: Cultivating Creativity in Our Kids***
by Kevin S. Krahenbuhl

- [8](#) ***From the OM Archives: Flying and Learning***
by Lawrence Williams

- [11](#) ***“Dear Diary...Okay, Now What?”: Teaching Kids to Embrace the Art of Journal Writing***
by E.R. Zarevich

- [12](#) ***Earth Cycles: Hideaways for Outdoor Fun***

- [14](#) ***From Science Student to Problem-Solving Investigator: Making Science Relevant with Authentic Inquiry***
by John Dorroh

- [16](#) ***Curriculum Spotlight: Grade 8 Physical Science Mechanical Engineering Lab***

- [18](#) ***Fostering Innovation***
by Lindsay Banton

- [20](#) ***Great Ideas from Oak Meadow Teachers***

- [22](#) ***Craft: Nature Looms***

- [24](#) ***News from the Meadow***



Welcome to our autumn issue of *Living Education*!

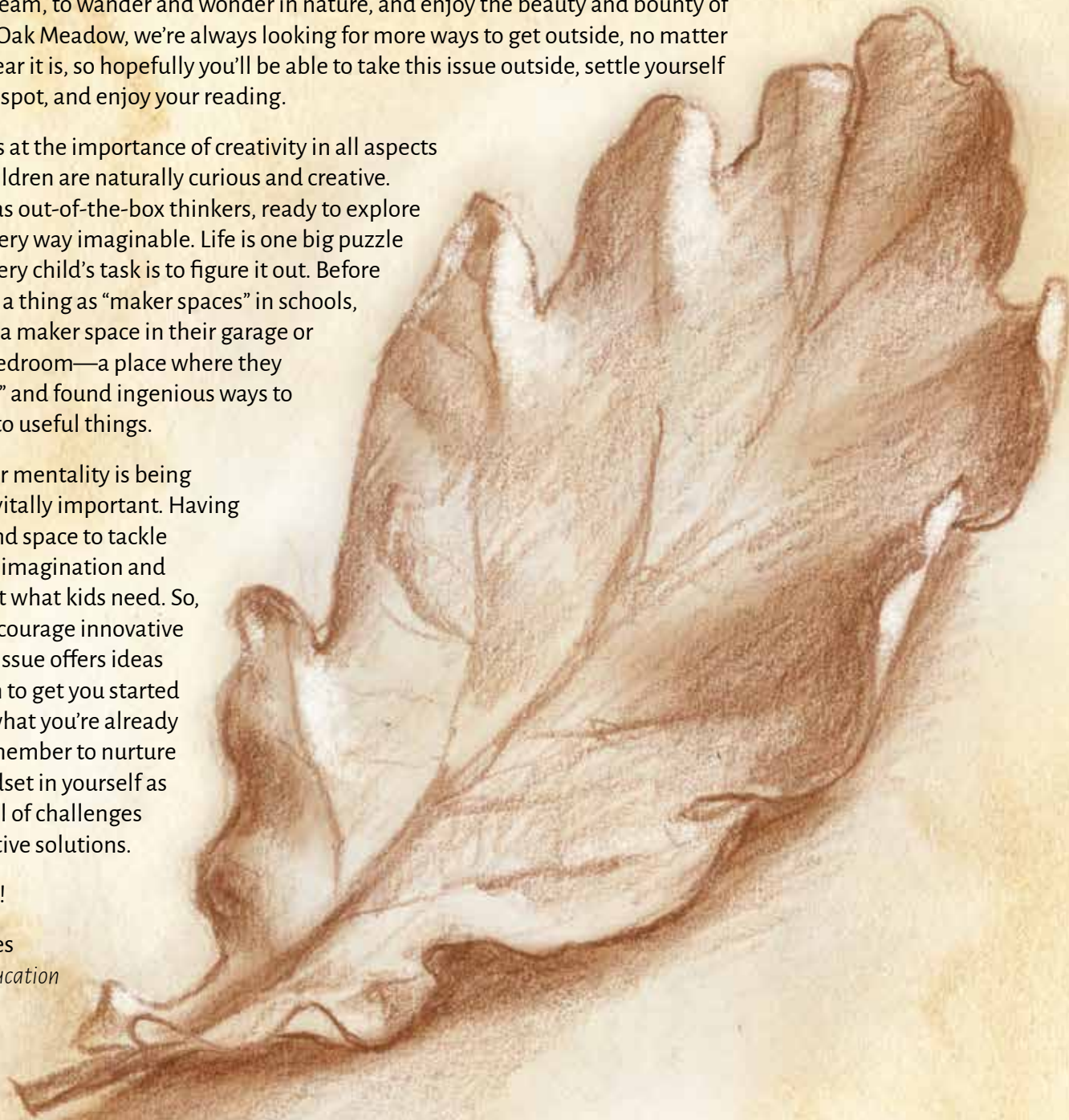
This issue arrives when those of us in the northern hemisphere are starting to think about the new school year but are not ready to let go of summer. There is still plenty of time to play and daydream, to wander and wonder in nature, and enjoy the beauty and bounty of the season. At Oak Meadow, we're always looking for more ways to get outside, no matter what time of year it is, so hopefully you'll be able to take this issue outside, settle yourself in a nice shady spot, and enjoy your reading.

This issue looks at the importance of creativity in all aspects of our lives. Children are naturally curious and creative. They are born as out-of-the-box thinkers, ready to explore the world in every way imaginable. Life is one big puzzle to solve and every child's task is to figure it out. Before there was such a thing as "maker spaces" in schools, many kids had a maker space in their garage or basement or bedroom—a place where they collected "junk" and found ingenious ways to transform it into useful things.

Now this maker mentality is being recognized as vitally important. Having the freedom and space to tackle problems with imagination and creativity is just what kids need. So, how can we encourage innovative thinking? This issue offers ideas and inspiration to get you started or expand on what you're already doing. And remember to nurture a creative mindset in yourself as well—life is full of challenges that need creative solutions.

Happy reading!

DeeDee Hughes
Editor, Living Education



meet me Halfway

A story of humility, whimsy, and coloring outside the lines

By Leah Massey

My husband, Tim, is amazing. Truly. He is an extremely logical, fact-based, spreadsheet kind of guy. Problem-solving and planning set his mind abuzz and bring on sighs of satisfaction that make me smile.

Our nine-year-old son, Tyler, is an intriguing little person. He is a creative, impetuous, day-dreamer kind of guy. Problem-solving and planning set his mind abuzz, too, and bring on sighs of satisfaction that make me smile.

Tim's idea of a perfect solution is the one that most efficiently addresses the current problem while foreseeing future issues and avoiding them. His solutions frequently appear like rabbits out of an illusionist's hat because he has a gift for thinking outside the box to find the simplest approach and then...SHAZAAM!...it just works.

Tyler, on the other hand, is the King of Whimsy. He dreams up completely illogical, impractical machines to solve contrived problems just because he can. One of his favorite questions is, "What if?" The laws of physics are mere details to be dealt with later. The more convoluted the solution, the more steps involved, the happier he is. Tyler would ask, "Why would you want to do things simply and efficiently when there is a much more fun and interesting way to accomplish this task?!"

Tim would ask, "Why would you waste time and energy on unessential details that add nothing to the functionality?" If that question were put to him, Tyler would probably answer, "Why not?"

These are diametrically-opposed approaches to life. But what if you could combine these two mindsets? What would be the result? Honestly, something far greater than the sum of its parts.

This was a lesson our family learned from a completely unexpected source. One night a couple of years ago, I stumbled across the reality show *Steampunk'd* on Netflix. The entire premise of the steampunk concept is a fantastic world of science fiction that combines Victorian-age technology and aesthetic with futuristic ideas. This was a show completely devoted to creators—

"makers"—who thrive on creating machines and décor that are crazy-fussy and entertaining, just because. *Steampunk'd* rewarded the people who had the most creative, outrageous designs or those that held the highest degree of verisimilitude.

Why do these people put so much thought and energy into convoluted solutions that are more fun than practical? Just. Because. They. Can.

Tyler was in awe. These were his people. They didn't just have some wild ideas. They built them! They took junkyard objects and used them in completely different ways than had been intended by their designers. They created backstories that drew you into their world. Their skill was undeniable.

Tim and Tyler were talking together about the unexpected ways these makers solved the problems given to them. Together they "oohed" and "aahed" over the workshops and tools available to the contestants. Tim commented on how quickly they turned out their product once they had their story concepts firmly in their minds. In short, the creative mindset of these individuals when paired with finely-honed skills resulted in some truly innovative solutions.

Sharing this show as a family was a gift. Tim started to appreciate that Tyler was very much like these makers. It opened his eyes to the fact that whimsy can be a positive trait. He stopped and took a look at himself, and realized that he could learn more than a thing or two from Tyler.





I was touched by my husband's humility. To hear him tell Tyler that he was moved to examine himself and acknowledge that he came up short in this area had an enormous effect on Tyler. Tyler felt validated to hear his whimsy has value.

Tim and I started to plan how we could help Tyler harness his creativity, cultivate it, and then use that personality trait to his best advantage. We talked for hours over the course of a week or so about helping him acquire the skills needed to put his inventiveness to work in his life. We continue to show Tyler the value of efficiency in our work, whatever it may be.

In short, we are trying to meet Tyler halfway. Halfway between logic and daydreams lies a sweet spot. Halfway between efficiency and whimsy lay the solutions—the best solutions—to countless problems.

As homeschool parents, Tim and I have taken on sole responsibility for shaping our children into considerate, productive citizens who are able to care for themselves and their families while giving the world more than they take. That conjures up visions of bullet lists, long-term timelines, and quarterly reviews. Structure. All very button-down, black and white. And you know what? That is all true.

But...BUT...embracing Tyler's sense of whimsy and the inherent curiosity and joy of childhood means our family can doodle in bright colors all over the black and white outline of our educational plans. I was inspired to choose a different approach to learning, an approach that allows more time for creative dreaming for each of us. This keeps us excited about the bullet items on our educational goal sheets.

Cultivating Tyler's creativity challenges my humility. Will I think outside the box I didn't even realize I was in? At the halfway point between logic and whimsy, I am rediscovering the joy of dreaming. The result is a more joyful learning environment that provides each individual the freedom to learn in their own way—an environment in which each of our kids can solve problems and overcome obstacles in a creative and efficient manner.

This only works if Tim and I self-assess our own creative mindsets. As parents, we must constantly check ourselves and the family ethos we are creating. Are we allowing our children's creativity to flourish? Are we nourishing and cultivating the very attitudes in ourselves that will facilitate our kiddos' abilities to think outside their own boxes? Because, after all, the very act of establishing an ethos creates a box of sorts. The key is to experiment frequently and be willing to work within a flexible set of guidelines.

My husband and I keep encouraging our children to identify assumptions and cast them aside when necessary. We want them to think for themselves. We show them how to use their creativity to come up with unique solutions to problems. We demonstrate how to work efficiently. We strive to have enough humility to be aware of the lessons they teach us each and every day.

Having identified the halfway point, where whimsy and logic coexist, we strive to keep it always in sight. Our own personalities and the ups and downs of life are a pull as relentless as the tides. We will spend the rest of our lives attempting to keep our home in this sweet spot. We will know we have succeeded in this endeavor when we someday see our kids inspire others to ask, "What if?" 🌱

Leah Massey spends her days wrangling her three free-range kiddos in Michigan. When not reading aloud or exploring her neighbor's butterfly garden you'll find her up to her elbows in dishes. Leah shares her family's learning adventures and lessons learned from two decades of homeschooling.
ourhabitatathome.com



Signature Thinking

Cultivating Creativity in Your Kids

By Kevin S. Krahenbuhl, Ed.D.

Those who choose to educate their own children seem to have a natural respect for allowing children the time and space to explore their world and foster their creativity. However, when it comes to the formal learning experience, I have found that all too often educators—public/private educators and homeschoolers alike—fail to promote productive creativity. My colleague and I have developed a framework for cultivating creativity called Signature Thinking that we use to help schools enhance creativity, and my wife and I use it in homeschooling our own four children.

The Signature Thinking Framework (displayed in Figure 1) outlines a series of essential aspects an educator must consider to create an environment that cultivates creativity in a productive manner. Let's look at how each of these elements of the Signature Thinking Framework can be woven into what you do with your students every day to cultivate creativity.

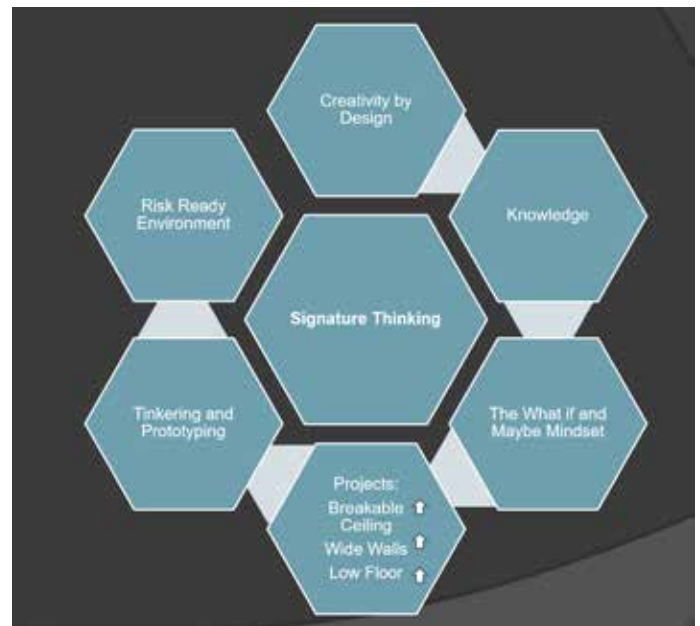


Figure 1 : The Signature Thinking Framework

Creativity by Design

Every teacher is a designer. We design curriculum (or organize it), we design activities, we design ways to assess learning, and so forth. But what do we do, intentionally, to foster creativity in our kids? This first element is primarily about accepting that it is up to us, as the teacher, to design a learning environment and experiences that promote, rather than prohibit, creativity.



Knowledge and Creativity

Although people often assume that knowledge and creativity are at odds with one another, the opposite is actually true. The more knowledge a person has about a topic, the more able that person is to create effective and valuable solutions. So, do not discount the importance of building foundations of knowledge. Instead, be sure to give your children rich exposure to help them develop broad and well-organized knowledge about each topic. Then, that can be leveraged by allowing them to identify rules and patterns related to that topic, and adapting or applying them in unique contexts. In this way, the learner is using their knowledge to engage in productive creative expression that enhances learning and facilitates problem solving.

The “What If” Mindset

Model the “What if?” mindset by always looking for possibilities. Be open to wondering about alternate scenarios and encourage your child to do so as well: “What if we took off the wheels; would it still go?” or “What if we had to create a _____ using only these materials?” Simply bringing that question to your discussions with your child can make a big difference in their consistent pursuit of creative solutions.

Projects

As homeschoolers, we all give our kids chances to work on authentic projects. But just adding in projects does not automatically promote productive creativity. When you create a project using the Signature Thinking Framework, it means the project includes three design elements:

Low floor: A low floor means there are clear basic requirements that must be met but are not so cumbersome they encompass the entire project.

Wide walls: Allowing wide walls means you should provide boundaries, but they should have significant latitude for the kids to decide how to navigate within them.

Breakable ceiling: The project should require students to extend themselves beyond the project parameters. In doing so, they must break the ceiling by adding a meaningful twist to the learning that demands creative expression.

So, our projects must provide boundaries to ensure learning is focused on the aims, but also nudge the kids to add their own unique pivot to what is expected so they meet and exceed the goals of the project.

Tinkering and Prototyping

Many of our learners rush to get everything “right” immediately and to get the work done. But we all know learning in life is not always like this. Usually a project will go through many iterations before it is final. And even then, we still play with it. Think of your cell phone. Even the final version of each is just the next iteration. We can facilitate this attitude in our children by encouraging—and even requiring—they to tinker with ideas and to prototype their work. Keep a collection of all the drafts of an ongoing work and look at the development of the product over time. Learning through this prototyping and tinkering style allows us to see the real messiness in developing and refining what we do. Furthermore, it necessitates a creative outlook in that we are always looking at the big picture and asking, “What’s next?”

Risk-Ready Environment

Nurturing an atmosphere that values risk taking can be challenging for many parents and educators. Think about it. Part of the reason we opted to homeschool our children is because we want to protect them from some things we deem to be detrimental. But, do we take that too far? We need to give our children reasonable latitude to take risks in their learning. In the school system, they want to grade everything. When you grade everything, it crushes any sense that learning may go through some progressions. But in the homeschool environment, our propensity to protect can also work against creating an environment that allows for smart risk taking. When you set up an environment that encompasses risk (risk of not knowing the outcome, risk of an unexpected result, or risk of failure), your children are given the chance for brilliant innovation. Bring that into your child’s experience so they are ready to take on challenges in the real world later.



Give It a Try

Everyone in education could do more to cultivate creativity in our kids. This should be among our top priorities. Articulate, elegant, and creative expression may be the most important outcomes of education. By applying the Signature Thinking Framework to what you do for your kids, you can design an environment that intentionally cultivates creativity and enhances the learning experience.

In the end, we want our kids to both fit in and stand out. The ways in which they pivot from and extend upon what is required forms the essence of their own signature work. 🌱

Dr. Kevin S. Krahenbuhl is Interim Director for the EdD Program in Assessment, Learning, and School Improvement at Middle Tennessee State University. In that capacity he works with public and private schools to improve learning for their students based on evidence-based cognitive research. Additionally, he and his wife homeschool their four children, ages 10, 8, 5, and 2, and some of these same ideas are woven into their efforts to equip their children with the tools and love for learning.



Flying and Learning

By Lawrence Williams

I am the sort of person who has to experience something before I can believe it. Like the time my Aunt Blanche told me I couldn't fly. Any sensible person would have instantly seen the truth of that and accepted it. But I was about six years old at the time, and being sensible was not something I was known for.

So I did the only thing I knew how to do: I decided to try it for myself.

I had dreamed I was flying many times, and it seemed very real and natural, but whenever I tried to fly by just jumping off the ground, I always came back down. I had also tried flying with a cape around my neck (actually, it was a towel...) like Superman did on TV every week, but that didn't work either. I had seen planes fly over my house, though, and they had wings, so I figured that if I got high enough (like on top of a barn roof) and put some wings on my back (like a piece of plywood) then I could easily swoop down in front of the kitchen window and show Aunt Blanche that she didn't know everything after all.

In the barn, I found an old piece of plywood that looked like it would make a good wing, and it took a while to cut some holes in it to put rope through for handles so I could hang on (a pretty sensible idea...). Aunt Blanche was busy in the kitchen, so she didn't notice what I was doing in the barn. It was a warm North Carolina summer day, and by the time I dragged the plywood to the top of the barn roof I was hot and tired. But I was so ecstatic with the joy of creation, full of the thrill of achievement known only to great inventors. I surveyed the surrounding countryside—acres of corn and soybeans as far as I could see—and felt alive and proud and free and brilliant.

I put my plywood wing on my shoulders, firmly grasped the rope handles, and looked toward the house just in time to see Aunt Blanche come out the door. I leaped straight off the roof (planning to make a smooth turn toward her as soon as I gained altitude...), and for one glorious second, I was flying! Then I heard her scream, and at the same time I began a slow, agonizing roll forward. I watched the ground move toward me, saw the barn, the bright blue sky, and then landed with a resounding thud on my back, my hands still tightly gripping the rope handles of the plywood wing under me.

For a few seconds I tried to grasp what had happened, and then I realized I wasn't breathing. In another second Aunt Blanche was by my side, pulling my hands from my wing and slapping me on the back.

"Breathe!" she was screaming, and finally I did, in long, deep, gasping breaths.

From the OM
Archives

"Are you alright?" she said, and in between choked sobs I managed to let her know I was. After she was sure I was okay, and after holding me tight and rocking me until I quit crying, she started laughing and said, "Lord, child, you ain't got the sense of a black-eyed pea!"

That made perfect sense to me, and we both laughed for a long, long time.

And I finally knew, from my own experience, that I really couldn't fly. At least not that way.

I'd like to be able to report that I'm more sensible now, but sometimes I'm not so sure. I'm a little more willing to listen to what other people have to say, but I still don't really believe something unless I experience it myself. Over the years, though, I've discovered that some of us just learn that way, and I've come to appreciate that it's perfectly okay to be that way. In fact, learning by doing is the way my intelligence functions, and the more I accept that and work with it, the happier I am, and the more I am able to express all that I am inside.

So, as your homeschooling journey continues, make an extra effort to appreciate the different ways your children learn. Some children can learn from what others tell them, but other children just have to do it themselves. In fact, that's one of the great advantages of homeschooling: the ability to work with your children as individuals and give them the opportunity to show you the unique genius they have inside. And the more you can do this, the happier they'll be, the happier you'll be, and the more successful you'll all be at homeschooling. But keep a close eye on the barn roof. 🌿

Lawrence Williams co-founded Oak Meadow in 1975 along with his wife Bonnie, in order to homeschool their own children. Since then, Oak Meadow's curriculum and distance learning school have helped families around the world create successful homeschooling experiences. This article was first published in Living Education in 1994.







“Dear Diary...Okay, Now What?”

Teaching Kids to Embrace the Art of Journal Writing

By E.R. Zarevich

Bring up the idea of a keeping a diary, and you might hear your students groan. There are countless films and books that depict diary-writing as the outlet for whiny, self-absorbed characters with petty problems and concerns, and *Harry Potter and the Chamber of Secrets* pretty much scared an entire generation out of keeping a diary. The turn-off factor is strong, I'll admit. But when you look past all that, you can see what an educator sees: a rich trove of possibilities for shaping the young, eager writer into an aspiring professional.

Encouraging students to keep a diary or journal is an excellent way for them to develop consistency, style, and original thought. Of course, every child, however enthusiastic for writing, will most likely encounter the roadblock that even bestselling powerhouse authors hit every once in awhile: writer's block, the universal curse of the creative.

I'm a private English tutor and creative writing teacher who works with kids at an afterschool center. What I've discovered through my work is that kids love the idea of having a notebook and writing something in it every day. The notebook is theirs, the pen is theirs, and the untouched, empty lines on the page are theirs to fill with their brilliant ideas, unique perceptions, and strong opinions. But due to lack of confidence, lack of practice, and especially lack of ideas, many kids find themselves staring down at the blank page with a scrunched-up brow, their minds churning hard and producing nothing. They write down the day's date. They write down “Dear Diary...” and then they have nothing. They have no starting point unless the educator or parent gives them one to work with. Enter the writing prompt.

The writing prompt has the disciplining focus of homework, but not the looming pressure of working for a good grade. You tell the student: Write about your hobby, your favorite sport, your last vacation. Write about that one book you can't stop rereading, or that fantastic movie you saw three times in the theatre. Write about the one food you can't stand or the one dessert you order at your favourite restaurant every time you go. Write about the job you want to have when you're grown up, and the second-place job, and the job you'd hate to do.

Simple composition tasks like these are what pull out the plug in that stopped-up brain and release the flood of creative ideas. Once the student has a topic to work with, their pen flies across the page, especially if you implement a time limit. Timed writing is an important skill, but you have to be careful with it. Some kids see time limits as a fun obstacle to be overcome, while others panic under the ticking clock and their creative juices freeze up. It

depends on each child's personality and tolerance level, and it's up to the educator or parent to decide what's appropriate. If you choose to give a time limit, pick a reasonable time frame, with enough minutes left over for them to check over their work once.

Once you've gone through a series of simple daily prompts over the course of a week or so, you can begin offering writing prompts that are more challenging, almost like a puzzle:

“You have been put in charge of organizing the Canada Day celebrations in your city this year. What will be the entertainment? How will you decorate the city park? Who will be the celebrity guest speakers, and will there be food? Write three paragraphs and be descriptive.”

Now, all of a sudden, the student not only gets to be creative, but they also get to experience an adult sense of responsibility. They get to plan a community event. They must be imaginative and realistic. How many people do they think will come celebrate Canada Day? Should the decorations have a red and white theme, or should the theme be Canadian symbols or something else entirely? If there is entertainment, such as a concert or a show, where will everyone sit, and what kinds of food feed a lot of people? Asking such questions shows your student that you take their ideas seriously, as you would the event planner of the real thing. That's what young writers crave more than anything: to be taken seriously.

And always, always encourage your student to write more. Expand, expand, expand! If their answer to “What did you do today?” is “Nothing,” don't let that slide. A day is twelve hours. Something must have happened in that timeframe that's worth writing about. Did someone make them laugh? What did they see when they went outside? How did the sky and trees and birds look that day? What about something interesting and inspirational they read, saw, or heard?

“Dear Diary...” starts as a blank page of possibilities. And your child deserves the beautiful satisfaction of filling it. 🌱

E.R. Zarevich is an English/ESL teacher who writes in her spare time. She resides in Burlington, Ontario, Canada. She has also been featured in *Understorey Magazine* and on the writing blog *Quick Brown Fox*.



Earth Cycles

Hideaways for Outdoor Fun

No matter what time of year it is, many of us want to spend as much time outside as possible. Summer and fall are good times to create some fun outdoor spaces where the family can relax, picnic, read, nap, and share adventures. Try these ideas and see where your imagination takes you.

Hideaways

Here is a simple way to make a new play space outdoors. Find a hedge, bush, or low-growing tree, and use clippers or a saw to carefully prune the lowest branches in one section. You want to open up a crawl space that is inviting but not too open. You'll need it big enough for you to get into, so make sure it is pruned properly.

Work your way into the space, pruning as you go by clipping branches all the way back to the trunk or nearest large branch—make sure no branch nubs are left to poke someone. Keep cutting away until you have a round, comfy space inside the bush.

Rake or brush away debris from the ground to make it more comfortable. You might even want to bring in an old blanket to sit on—there's no rule that says outdoor hideaways have to be uncomfortable! Once the hideaway is complete, have a picnic inside or bring in a basket of books for story time.

Outdoor Rooms

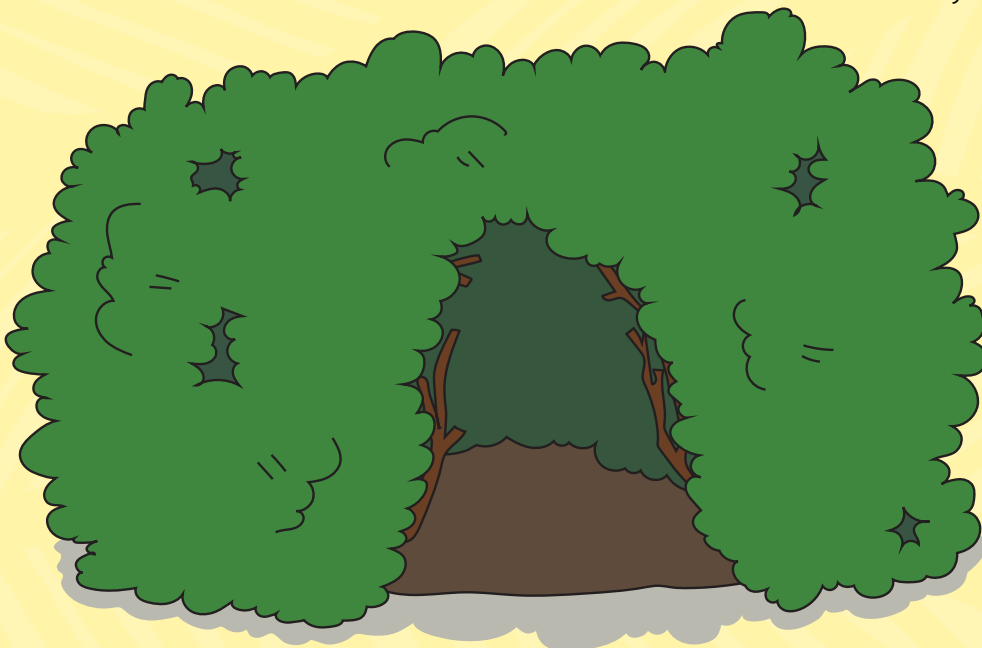
It's lovely to have a room to relax in, even when you are outdoors. Creating a woven wall for privacy and shade can make an outdoor room feel cozy and peaceful. Choose a space that is a little out of the way, perhaps in a fence corner or under a tree. Look at the nature loom craft found in this issue to get an idea of what you'll be doing. Picture a large nature loom that stands up like a wall on one side of your outdoor room.

Make a large frame by sticking two tall, sturdy sticks into the ground and then tying two long cross-pieces. The length and height of your sticks determines the length and height of your loom "wall." Make sure the two legs of the frame are pushed deep into the ground so it doesn't topple over as you are weaving it. You might even want to make an L-shaped double wall to make it sturdier and less likely to lean or fall.

Once the large frame is securely in place, string it horizontally with twine or colored yarn (so you have many horizontal lines of string).

Vertically weave into the strings long grasses, flowers, sticks, corn stalks, or any other wall decoration you'd like. Or you can string the frame vertically (so you have many vertical lines of string) and weave it horizontally using ribbons or bits of fabric to make a more colorful wall.

Now your room is ready for stumps or logs for seating (or lawn chairs and a table). Add seat cushions, a basket of apples for snacking, and any other homey touches.



*Here are some resources
for more fun ideas:*

Creating Imaginary Worlds (*The Green Parent*)

Make a Willow Den (*Raising Sparks*)

How to Build a Living Playhouse (*Owner Builder Network*)

Plant a Living Playhouse (*North Coast Journal*)

Woven Fences

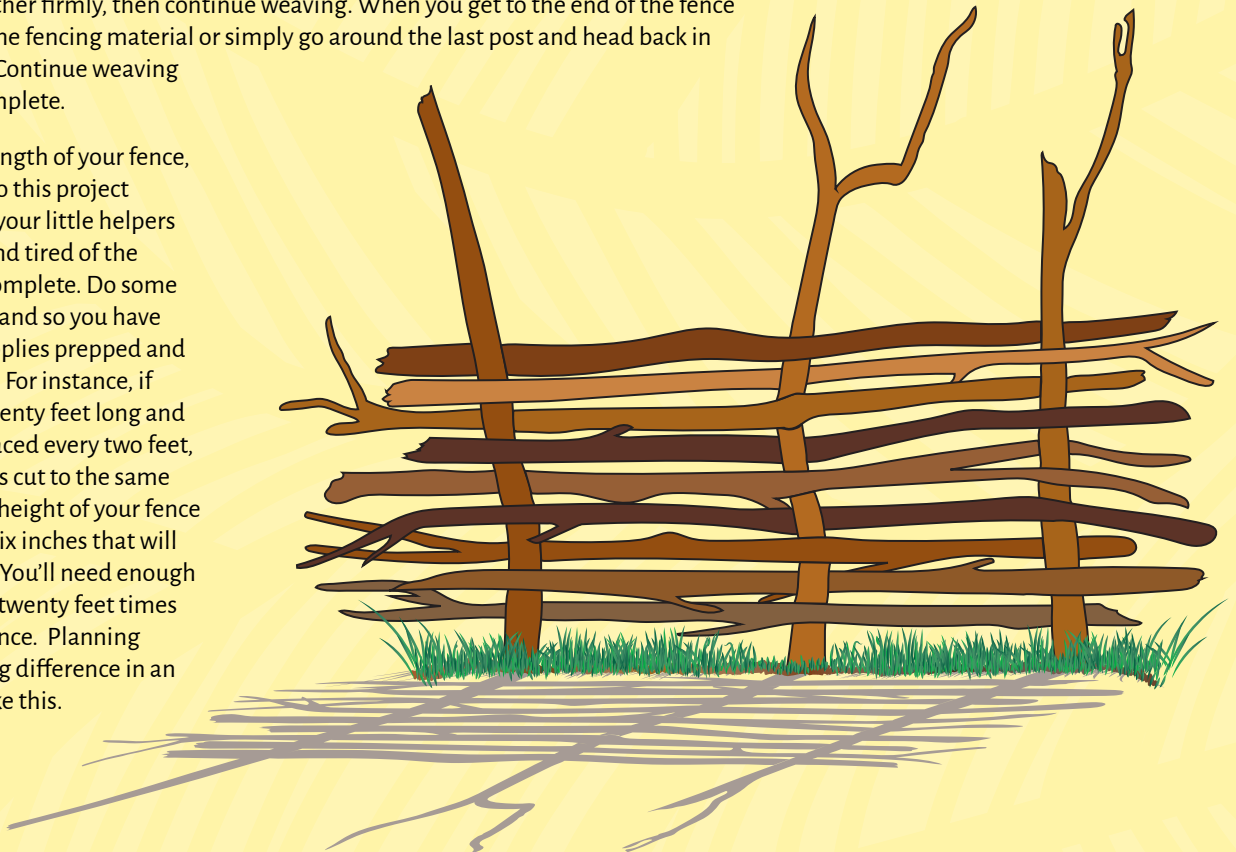
In addition to hideaways and outdoor rooms, fencing can be used to divide space, visually and physically, for different uses. You can create a fence woven of natural materials to mark off a space dedicated to play, or to fence off a place where play is discouraged. The natural materials will blend in and give a sense of harmony with the living environment.

Begin by placing thick sticks or stakes (“fence posts”) into the ground along the path you want the fence to take. These can be tall or short, depending on how you want your fence to look. Sometimes just a one-foot fence is enough to guide visitors and create a pleasing scene. And remember, your fence doesn’t have to be straight! A long curve or lazy S-shape will provide a beautiful fence line to draw the eye into the yard or garden.

Place the stakes one to two feet apart or further, depending on your fencing material. Willow branches or any other thin, flexible branches work well as fencing material. You can also use fat yarn or ribbon for a more colorful garden design.

Secure one piece of fencing material to the first stake, close to the ground, using string, and then begin weaving in and out of the stakes. (If you are using yarn or ribbon and your stakes are far enough apart, it can be fun to walk the path, swerving around each stake, unwinding the yarn or ribbon as you go.) Whenever the fencing material runs out, overlap another piece and bind them together firmly, then continue weaving. When you get to the end of the fence line, you can tie off the fencing material or simply go around the last post and head back in the other direction. Continue weaving until the fence is complete.

Depending on the length of your fence, you might want to do this project over several days so your little helpers don’t get worn out and tired of the project before it is complete. Do some calculations beforehand so you have all the necessary supplies prepped and ready ahead of time. For instance, if your fence will be twenty feet long and the stakes will be placed every two feet, you’ll need ten stakes cut to the same length (which is the height of your fence plus about three to six inches that will go into the ground). You’ll need enough fencing material for twenty feet times the height of your fence. Planning ahead can make a big difference in an ambitious project like this.



From Science Student to Problem-Solving Investigator

Making Science Relevant with Authentic Inquiry

By John Dorroh

What does science look like for your students? Many science programs look the same: students following cookbook “recipes” that are nothing more than a series of checklists for them to complete. In other words, all the thinking is done for them.

Doesn't sound like much fun, does it?

Making observations about the natural world and asking questions about those observations is the basis for most “good science.” However, it requires more than merely observing something to make a meaningful statement about what those observations mean in a broader context.

What if your students were asked to design an original experiment, one that required them to form a hypothesis, collect data, form a conclusion, and present it? Yes, it sounds a bit daunting, but when the students (and teacher!) don't know what the outcome will be, things get a lot more interesting.

Advantages of Authentic Inquiry

Authentic inquiry is an instructional approach that allows students to explore and discuss concepts, relationships, and patterns in contexts that involve real-world problems relevant to the lives of students. Instead of being told what they need to know, they learn

by doing. Rather than just finding answers to questions, they look for solutions to problems. Big difference!

This is not a new concept. Chefs become better cooks by cooking; if something doesn't taste right, they try to find out why. Writers hone their craft by writing; if a plot or character isn't working, they identify what's missing and find a way to incorporate it. Students learn to be better scientists by doing science that is grounded in a real-world context.

Authentic inquiry is a model for learning other subjects, as well. Science is a great place to begin, and then you can expand your teaching to include authentic problem-solving opportunities in other subjects.

Sometimes homeschooling parents and classroom teachers worry they lack the equipment to “do science” with their students. However, some of the best science teaching is done without Bunsen burners, expensive glassware, microscopes, and computer software. For example, “Which material best insulates beverages?” is a typical question that can lead to a variety of investigations that use simple, easy-to-find materials. Common objects like Styrofoam cups, plastic spoons, glass jars, simple thermometers, and a timer can be successfully used for science explorations on a budget.

Using Problems to Focus Learning

To introduce a problem, lead students into the learning activity by asking a question. This gets them actively thinking instead of passively waiting to be told what to do. One way to begin is to conduct a pre-lab discussion before anyone goes into a lab mode. I often have my students “write into” the investigation using a journal entry. Pose a general question related to the concepts you are studying, such as, “Which of the following do you think would best keep a hot beverage hot for the longest period of time: a thermos with a glass interior, a Styrofoam cup, or a plastic cup?” Set a timer for three to four minutes and let students write until the buzzer sounds. Students can be invited to read their ideas aloud. This pre-lab prep gets students interested in the problem, curious about the outcome, and ready to find a solution.

Another way to fire up this sense of readiness is to talk about the variables or factors that can affect the outcome of the

What happens when students are challenged with meaningful, relevant investigations and activities?

- Students enjoy learning science and have more positive attitudes about the subject matter.
- They gain a deeper understanding of the principles and concepts.
- They become more flexible and creative in their thinking.
- They make connections to other disciplines.
- They learn to collaborate and consider alternate explanations or solutions.
- They begin to understand how scientists really work.

experiment. Variables, when considering beverages insulation materials, include the initial temperature of the liquid, amount of liquid used in each container, time intervals to be used for checking each temperature, etc. Help students identify and isolate all the variables, forming the parameters of the procedure. For example, three containers of three different materials are to be used, each with 200 ml of water at the same temperature, and temperatures will be checked every 10 minutes.

Once students have mulled over a question and considered how to control the variables in the procedure, they are ready to write a hypothesis and begin collecting data. Notice how much learning, reflection, and application of knowledge has already gone into the activity, before they even begin! This is real scientific engagement.

As the data is collected, the students must place it into some sort of organized form, such as a chart, table, or graph, to help the students accept or reject the hypothesis. At this point it's important to ask them what went wrong and why. How could the experiment be improved? How do the results relate to everyday life? Require them to be responsible for some form of presentation to communicate their findings. Sharing knowledge is an essential life skill, and it keeps them invested in the learning process every step of the way.

More Opportunities for Authentic Problem Solving

The more you and your students engage in the problem-solving approach to science, the easier it will be to create active science investigations. To help get you started, here are a few ideas to try:

- I asked my students to prepare a soft drink that would cause a grape to become suspended in the middle of the container. They were given very little instruction and minimal materials: water, sugar, food coloring, and various flavorings. This project might seem more fun than practical but try asking students how this could have practical applications. When might suspending something in liquid be useful? Their answers might surprise you.
- I brought in large plastic bags full of that notorious green “killer vine” that is found everywhere in the South: kudzu. I asked each lab group to find out what they could about the plant’s properties and to come up with a useful product using kudzu. One group made glue; another made a crude paint. I was flabbergasted at the diversity in their discoveries.
- Based on my mentor’s problem-solving scenario called “Lake Muckygoo,” I gave students an environmental challenge. Students were given a detailed document, “The Waterville Dilemma,” which presented all sorts of environmental issues in the hypothetical western town of Waterville. Working in small groups, students formed Town Council meetings to generate solutions for each issue and to make formal presentations. Homeschoolers can collaborate with peers (in person or virtually) on an elaborate project like this; if your homeschooler is working independently,



you might work together to come up with a list of environmental concerns in Waterville and let your student choose one to focus on.

- Another project was “Where’s the Beef?” The goal of the investigation was to find out which is more nutritious: ground beef or ground turkey. Students designed and conducted a laboratory investigation and then translated the data collected in the lab into visual form to make it easy to grasp. As an extension of the investigation, they sent their reports to the two businesses (ground beef and turkey companies). About a month later, the students received responses stating that their work had been recognized on a national level!

Adding authentic inquiry to science classes takes some added investment on the part of the teacher, but the reward—engaged students invested in their own learning—is well worth the time and effort. As students become increasingly competent in their problem-solving skills, they exhibit a sense of ownership and take pride in their work.

So, ask questions and let them figure it out! It may get messy, and the activity might not go as planned. Students might not get the “right” answer, their experiment might not work, they might have more questions at the end than they did at the beginning. But that’s what science is all about: the quest for knowledge. Authentic inquiry empowers students to charge ahead on their quest. 🌱

John Dorroh taught secondary sciences for almost 30 years. Now he consults with teachers in several states, sharing with them strategies for helping young learners understand science using reading and writing. “Never stop exploring your world,” he tells his teachers and students.





Curriculum Spotlight

In grade 8 physical science, students have varied opportunities for creative problem solving. Designed around Next Generation Science Standards (NGSS), the Oak Meadow physical science course offers projects that allow students to demonstrate their mastery of core concepts by applying their knowledge and creativity in practical—and awesome!—ways. The lab below is a good example of this. Give it a try!

Ping-Pong machine

Design and build a single machine that uses at least four out of these six simple machines: inclined plane, lever, wedge, wheel, gear, and pulley. The task for this machine will be to move a Ping-Pong ball a distance of at least five feet without any effort on your part except to start the machine. You may use any materials you like, including cardboard, tape, string, tubes, dowels, glue, wood, weights, etc.

For instance, you might add weights to a pulley system to lift the ball up to a ramp, or a lever can force the ball upward or be used as a catapult. There are many possibilities. The machine should be made to be completely self-operative; once the ball is set in motion, neither it nor the machine needs to be touched in any way. When you have succeeded, draw a detailed diagram and write a description of how it works.



Project Design and Implementation

The following guidelines can help you as you design, test, and refine your model. Read through all the steps before you begin.

Question: Begin by figuring out what you want to make. Which option will you choose? What do you want your machine to do? Try to get a picture in your mind of the finished product.

- Write a brief description.

Research: Next, figure out what materials you will use for your model. What kinds of tools will be most useful? Create a basic materials list and expect to add to it as you develop your model. Before you begin, assemble all the supplies and tools you think you may need.

Design: Once you have a plan, draw a few sketches of your design. This will let you make adjustments to the design before you begin constructing your model. If you decide to use additional materials or tools, add them to the lists above. Label your sketches with measurements, materials, or any additional notes that will help you as you work. The sketches will serve as your guideline.

Discuss: Discuss your project idea with others. Show them your sketches and describe your plan. Ask them for their ideas on refining your design. You might use some of their ideas, or their ideas might help you discover a new way of improving your design.

- What will you change, if anything, about your design based on your discussions?

Create: Construct your model. You may have to test and refine your design repeatedly before it does what you hope it will. Don't worry if the model doesn't work as originally designed. Make adjustments and keep trying!

- When creating your model, was it successful the first time? If not, what went wrong?
- What did you do to fix it?

Share: This project can be shared in person or you can take a photo or video of it to share with others. If your model came out quite successfully, you might want to recreate how you made it on video and upload the video so other students can have a clear procedure to follow.

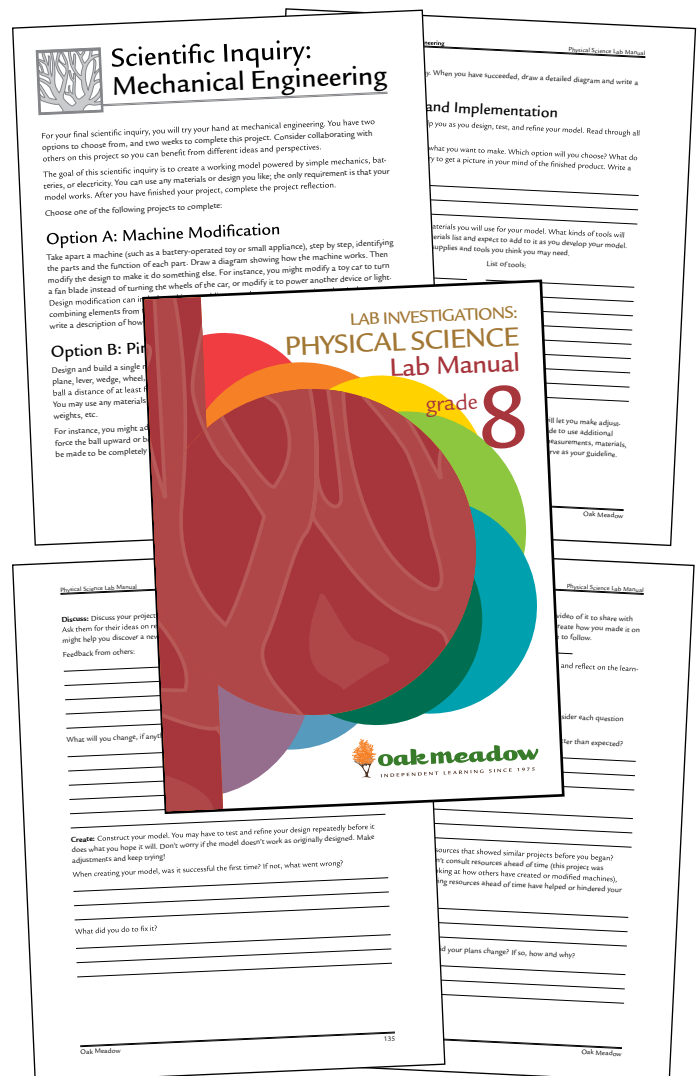
- How will you share your model?

Reflect: Fill out the project reflection to assess your project design and reflect on the learning experience.

Project Reflection

After you have completed your project, complete this self-assessment. Consider each question carefully. Take the time to reflect on the experience before answering.

- Thinking back on the process of creating your project, what worked out better than expected?
- What didn't work out as planned?
- Did you watch videos or find other resources that showed similar projects before you began? Were these sources helpful? If you didn't consult resources ahead of time (this project was designed for you to dive in without looking at how others have created or modified machines), do you wish you had? How might viewing resources ahead of time have helped or hindered your process?
- Once you began creating your project, did your plans change? If so, how and why?



Fostering Innovation

By Lindsay Banton

Preparing our kids for the world they will be a part of when they complete their schooling is a monumental task. When we think about how far innovations and technology have come, it feels mind-boggling to imagine where things will be even just five years down the road from now. How do we, as homeschoolers, prepare our children for this innovative new world?

I have thought a great deal about the future of innovation. I enjoy brainstorming ways to do the same tasks more efficiently, cut out the middle man as much as possible, and create solutions based on materials I have available. Each time I dwell on what it will take to produce innovators, I remember the age of innovation in our recent U.S. history. Think back to the short span of years when America had a major boom of incredible inventions (“What Was the Greatest Era for American Innovation?”). The 1920s brought us refrigerated train cars and processed foods. It brought us streetcars and subway stations. Electricity in homes! Chain stores and mail-order catalogs!

With the skills our inventors had just prior to the Roaring 20s, they were capable of building a nation full of great technology. They built on what they already knew and made it better than before. This boom in innovation demanded creativity and imagination, and fostered a growth spurt in opportunity.

The future holds the same demands and opportunities. How can we help our homeschoolers develop the skills to meet those demands so they are ready to grasp the opportunities?

Give Tasks

In my house, we spend a lot of time building, creating, crafting, talking about ideas, and exploring potential answers to problems. An excellent moment for this type of discussion happened naturally a few months ago. We had an unusually late ice storm in our part of the nation, causing major damage to our old maple trees. A huge limb broke under the weight of the ice, a limb the size of most tree trunks. It was too large and heavy for my husband and me to move ourselves, so it sat there, stuck among the other branches until nicer weather arrived. One day the kids and I were sitting outside, and I proposed the problem to them. Using the tools and resources we have here already, how would they get the limb down safely? They sat and thought for a bit and decided that a pulley-style system—built with a long rope tied to the limb, taken around the next tree and tied to our 4-wheel drive vehicle—could muscle the limb down. I loved their idea and asked further questions. What direction should the rope go based on the busy road nearby? How quick/slow and near/far will the car need to be driven? What type of rope would be best?

These moments are what I dream of as I homeschool my kids. Real-life scenarios that require real-life solutions are perfect kindling to spark the creative thinking of tomorrow’s innovators. Sometimes I think we, as parents and educators, are too quick to solve the problem ourselves, and we skip over the chance for our kids to have an idea. Slowing down and talking out their ideas and offering good questions to spur thinking can super-charge the spark of learning.

Give Tools

Providing the equipment to tinker is important and for me, that means allowing them to keep things I would normally recycle or toss. Like many, I am slowly jumping on the bandwagon of decluttering and simplifying, so it goes against what I wish in a tidy house. But allowing my kids to keep a stash of “parts” to tinker and create with opens the door to a creative mindset, and it’s fun to watch what they come up with. We have a box of engineering supplies that includes springs, washers, bits of this and that, and other helpful things that might be needed when the spark happens. They keep scraps of fabric and bits of elastic so they have supplies when they need them. It’s their own “maker space.” So far, my daughters tried to build an alarm system that would ring when their younger brother entered their room, design elaborate forts, and create other wild contraptions using only the parts they already owned.

One of my favorite cinematic scenes is in the movie *Apollo 13* when the team of scientists and engineers on the ground have to create an emergency air filter made with only the parts found on the spacecraft and provide the astronauts the steps to craft it. This inspiring moment motivates me every time I have to prepare dinner with random ingredients in my kitchen! I frequently find myself saying, “What can I make with what I have?” This is an essential real-life skill (especially when you are faced with a hungry family waiting for dinner!) and one that takes lots of practice.

Give Time

Tinkering, inventing, creating, and imagining takes time. Children need to experience both kinds of time: extended times of exploratory play that give brains space to imagine, and tasks with limited time (solve the problem the best you can in X number of minutes) that provide motivation to rise to the challenges. *Harvard Business Review* found that “innovation flourished in densely populated areas where people could interact with one another, where capital markets to finance innovation were strong, and where inventors had access to well-connected markets” (“When America Was Most Innovative and Why”). So, if we are looking



to the past in hopes of preparing for the future, we should give our kids peers to work alongside, the supplies to build, craft, and create, and opportunities to produce solutions to real-world problems. We should have conversations about vacancies we see in our innovated world while we go about our day. Sentences that begin with "I wish there was something to help me make such and such happen faster/easier/cheaper" are always good places to start brainstorming a potential idea.

The world needs freethinkers, creatives, risk-takers, and non-conformists to be prepared to innovate in the future. We need engineers and crafters who can take apart and reassemble old sewing machines, tools, and DVD players for fun, so, when the time comes, they already have the schematics tucked away in their creative minds.

So, homeschooling parent, how do we add our voice to this conversation of innovation? We simply start talking about "I wish there was..." and allow the talking to continue. We make space and time for kid-sized tinkering that leads to adult-sized innovators. We homeschoolers could be just what our world needs. 🌱

Lindsay is a homeschool mom to three kids, married to a fabulous man that roasts coffee at home, and is constantly working to grow her boot collection. She and her husband are veteran campus ministers at a university in New England.

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Great Ideas

What advice would you give to encourage students who seem stuck or overwhelmed by a challenging problem or assignment?

- Sleep on it! Everything will look entirely different in the morning. Or, go for a run or some other relatively mindless, repetitive exercise, to allow the mind to go blank.
- Break the problem down into small parts, and identify small, attainable goals. Work on one at a time and celebrate your little successes along the way.
- Have a brainstorming session to come up with possible solutions. Talking about the problem with others can help you look at it in new ways.
- Go for a walk and take time to be aware of the process of being creative, which doesn't have to be instantaneous. Walking will help your ideas shake loose or work themselves into new shapes and possibilities.
- Approach the problem by doing what you are good at and what you enjoy. For instance, if you love cats, try incorporating cats into an assignment you are struggling with. Change the assignment so cats can be part of the whole learning process.
- Keep your sense of humor! Take a break to laugh, do a goofy dance, watch a funny video clip, or read a comic. You'll come back to the problem in a more relaxed frame of mind.
- Reach out to someone (such as a parent, a teacher, an older sibling) and ask for help or explain the trouble you are having. Sometimes just mentioning it can help you move from being stressed to looking for solutions.
- Try a different approach: draw the problem, talk it out, or write about it creatively. New ideas may pop up from these different exercises.



from Oak meadow Teachers

Students sometimes wonder when they will ever use the skills they learn in school. Give an example of creative problem solving in your own life.

- Cooking is all about factoring, math, and problem solving.
- When hiking or camping, you have to calculate how many supplies you'll need based on how far you are going, the climate, terrain, and the fitness level of everyone in the group (because you'll only travel as fast as the slowest person).
- Maple sugaring requires you to boil the sap, but the boiling point changes based on where you are, what the weather is, and what your altitude is. These are all things you must factor in.
- Weaving is all about trigonometry. Sewing requires measurements and calculations.
- In four-wheeling, you need to use physics skills to know where to sit, how to move, and when to add more power, so you don't tip and so you can get up that hill.
- Farming and animal care requires endless problem solving. How can we repair the gate using the materials we have on hand? How much hay will we need to buy for the winter? How much do we need to charge for eggs to break even on the care and feeding of the chickens?



Some students don't consider themselves creative. How would you respond to that? What activities or advice might help them develop a creative mindset?

- I was just listening to "The Hidden Brain" on NPR. They were just discussing that some of the most successful creative people are successful because they are highly structured. They set aside time in their day, free of distractions, for their creative endeavors. The "free of distractions" is important to let the mind go deep into anything. This seems to fall in line with Oak Meadow's philosophy "from form comes freedom." We need structure to allow the freedom to create.
- I really like using tools. Tools can be a gateway to creativity because they allow me to do things I cannot do on my own. For example, I can build things with scraps of wood I find around the barn with my power drill/screwdriver, and make boxes, tables or sculptures that I maybe wouldn't have designed or built without my drill. Another avenue is to make something new from something old. Grab an old chair and use your tools: hammers and wood glue to reconnect loose legs, sandpaper to take off old paint, and paintbrush and painter's tape to apply a new coat of paint. Let your creativity flow as you redesign an old piece. The mindset I get in is that someone else already built this thing, so I'm free to make it personal.
- Learn how to use a camera and see where your imagination takes you as you focus the camera lens on different subjects.
- Use a variety of media, such as clay, wood, food, or mud. Give yourself permission to play with the materials—don't think "I have to create something." Just play around with the materials and see what happens.
- Every person is creative in their own way. Embrace your own kind of creativity. I love when students surprise me by approaching a question in a way I hadn't thought of. In general, try to think "outside of the box" rather than trying to come up with what you think the teacher wants.
- Play board games! Settlers of Catan, Chess, Mancala, Monopoly, and Pandemic are just a few to try. Playing board games teaches us to be creative, analytical, cooperative, focused, and observant. And it's fun! 🌱



Nature Looms

Nature looms are the perfect way to connect nature and art. Try this sweet craft that is fun for all ages.

Once you know how to make a nature loom, you might want to paint the sticks before stringing the loom. You can also hang ribbons, beads, feathers, or other decorations off the frame to further embellish your artwork.



Materials

- Sticks for the loom base
- String, yarn, or twine
- Scissors
- Nature items: flowers, twigs, sturdy grasses, feathers, bamboo, ferns, leaves, etc.

Instructions

1. Go on a nature hunt to collect sticks for the frame and items to decorate the loom. You'll want a good selection of sticks to choose from, especially if you are making more than one loom.

2. Looms can be made in any shape. A square shape is easy to start with. Break four sticks into even lengths. Lash two sticks together in an L shape. Repeat with two more sticks, and then join the two Ls together.

3. Once the frame is complete, tie a piece of string to one of the corners. You'll want enough string to make plenty of loops around your frame. Wrap the string around and around the loom to prepare it for weaving. To keep the string firmly in place, wrap it around the stick twice before moving on to the next line. When you are happy with how it looks, cut the string, and tie it off onto one of the sticks.

4. Choose the largest or sturdiest of your nature items and begin weaving it into the strings of the loom. Continue adding items, saving the most delicate for last so they won't get crushed or broken.



5. When your loom is complete, hang it outside or inside. Continue to weave in treasures as you find them or make new looms of different shapes or sizes. You might also like to make looms based on a nature theme, such as a loom woven entirely with different types of leaves, grasses, or wildflowers.



News from the meadow



Oak Meadow

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We have a shiny new website! And a spruced up, updated logo!

We launched our new website this summer, with the goal of making it easier for you to navigate and find the information and resources you're looking for. At the same time, we dressed up our logo, colors, and fonts. While we may have a fresh look, rest assured that our mission hasn't changed one bit: Oak Meadow remains committed to providing a flexible, progressive education for independent learners around the globe.

Visit oakmeadow.com and check it out.



Virtual Info Sessions and Oak Meadow's Annual Fall Open House

Have you been thinking about trying Oak Meadow's curriculum, or enrolling your child in our distance learning school? Still have questions after browsing our website and viewing curriculum samples? We offer you two ways to get to know us better.

Join us for one of our live **Virtual Info Sessions**. An educational counselor will provide more details about our curriculum and explain how enrollment in our distance learning school works, followed by an open Q&A session. Register on our website

www.oakmeadow.com/virtual-info-session

If you will be in the New England area for a fall foliage visit, we'd love to see you in person at our annual **Oak Meadow Open House** in Brattleboro, VT, on Saturday, Oct. 13 from 11am to 1pm. It's always a festive event, with about 150 visitors. You can browse our curriculum, meet our teachers, and network with other homeschooling families. Visit our website for more information.

www.oakmeadow.com/open-house



College Counseling Webinars

Is there a homeschooling teen in your family who's looking ahead to college? Let us help you with the college search process. Our free webinars are designed especially for distance learning and homeschooling families. We offer an introductory college counseling session as well as a series of topical webinars for juniors and seniors—but families with students of any age can attend. Find more details and sign up on our website.

www.oakmeadow.com/college-counseling/college-counseling-webinars



Homeschool Support

For families using Oak Meadow's curriculum without enrollment in our school, we are now making our **Homeschool Support** consultation service available to more homeschooling families by offering it at a new, lower price.

<http://www.oakmeadowbookstore.com/Resources/Homeschool-Support-Programs/Homeschool-support-hourly-p3239.html>

Whether you are a new homeschooling parent with lots of questions, or a veteran with specific topics in mind, we can provide you with student-centered educational guidance provided by an experienced Oak Meadow teacher. Topics might include organization, pacing, planning, teaching multiple grades, and more. Homeschool Support is purchased by the hour, and the service is delivered by the Oak Meadow teacher via personalized phone conversations. These conversations, which may be divided into 15 minute, half hour, or hour segments, and used over the course of the school year, will provide the inspiration and support you need to have a successful homeschooling experience using the Oak Meadow curriculum. 🌱



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