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Cambium

VOL. 5, NUMBER 2

INNOVATIVE K-8 CURRICULUM FROM THE ARBOR SCHOOL OF ARTS & SCIENCES

AIMING HIGH, ASKING MORE

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Arbor's thematic curriculum provides a predictable shape to our years and a host of happily anticipated rituals and celebrations of children's learning. Our themes are chosen to harness the strengths already apparent in our students, to tap their natural energies, modalities, and enthusiasms as we invite them into hard but satisfying work of probing and responding to the world. Although the large themes and the essential questions we investigate within them are constants from one cycle to the next, our teachers have remarkable latitude within that structure to adjust their instruction to the needs and interests of the particular children in their charge. That means they can tend students' progress toward our most critical aims regardless of content—developing the habits and attitudes of an engaged learner and community member.

What does it look like when children are acquiring initiative, persistence, effort, courage, insight, and creativity, along with capacity for planning, follow-through, time management, craftsmanship, collaboration, writing, making, presenting, reflecting, assessing, adjusting, responding to feedback, and a disposition to give their all? Within these pages you will find extracts from our Thematic Curriculum publications detailing our broad aims in designing curricula for Primaries, Juniors, and Intermediates at Arbor School, illustrated with snapshots of current work at each level. If you

notice a common theme in this content, it's intentional: our Theme studies meld across levels at a number of points, and this year has brought a K-8 focus on environments and mapping. In our close-knit school, every classroom's studies become richer when they are echoed by work older and younger children are doing. Juniors are learning how our city grew on the banks of the Willamette River, platting land claims and mapping their own imagined settlement with respect to the natural resources of the area, while our Intermediates are mapping the whole world and researching its characteristic biomes. Primaries have been studying the amazing feats of migrating animals while developing a sense of stewardship for the oceans and terrestrial environments those creatures inhabit.

All of our Theme work takes place under the umbrella of a curriculum designed to foster rigorous reasoning across disciplines and to instill in young children an appreciation of—and desire to contribute to—the human tradition of intellectual excellence. The Arbor Center for Teaching has just published *The Idea of Arbor School*, an encapsulation of the philosophy, principles, aims, teaching practices, governance, and stewardship of place, community, and culture that have shaped this school in its first 25 years. We are pleased to open this issue of Cambium with an excerpt from Kit's book.



ARBOR SCHOOL
OF ARTS & SCIENCES

THE IDEA OF ARBOR SCHOOL

AN EXCERPT FROM CHAPTER 4: CURRICULUM

by Kit Abel Hawkins

DEVELOPING INTELLECTUAL VIRTUE

Intellectual virtue may sound like an old-fashioned phrase, but it aptly describes what we are trying to help our students reach for. The Greek word for “virtue” is *arete*, which was translated by the Romans as *virtus*: “excellences.” Our aim is to guide our students to excellence in their habits and attitudes as thinkers. Long practice in thinking clearly and learning deeply leads students to develop a proclivity for questioning, effort and perseverance in sorting out the answers to questions, testing for evidence, analyzing deeply, synthesizing knowledge in order to solve novel problems, creating new connections, and demonstrating resilience in the face of challenges. These habits and attitudes enrich and deepen living, not just school life, and are among the most powerful outcomes we can hope for.

Internalizing the foundational skills of literacy, of numeracy, and of reasoning in multiple realms of discourse is another facet of developing intellectual virtue. Thinking clearly depends in part on practicing foundational processes and facts until they become automatic, freeing the short-term working memory to manipulate novel information. The capacity to utilize knowledge, skills and understanding in new situations is the hallmark of robust learning. Reading fluently, having ready access to math facts and procedures for handling certain problem types, routinely using conventional spelling and sentence structure—mastery of these and a host of other automatic routines leaves the mind ready to maneuver in unfamiliar contexts. To become an expert is to have ever more of the knowledge and procedures of one’s field automatically at hand.

Building a strong base of understanding of fundamental concepts in science and the social sciences is likewise key to developing intellectual excellence. It is critical for students to leave Arbor with a strong skeleton of concepts about the world—from Newtonian mechanics to the universals of human culture—that break down the sturdy prejudices and misconceptions human beings commonly hold. We want children to understand and marvel at the way plant life depends on sunlight, water, and CO₂, producing oxygen that supports animal life in an efficient and seemingly miraculous cycle. Social and cultural concepts are equally important. All peoples tell stories to explain the mysteries of life—stories that are different in character and inflection but uncannily alike in structure and purpose. Across cultures human beings transform utilitarian objects through art; they prod at their world in order to understand its patterns and calculate predictions about recurring events. By asking our students to engage with big ideas over and over, we develop their ability to frame the world inside these grand conceptual arcs and invite them to contribute to the human legacy of intellectual excellence.

THINKING ACROSS DISCIPLINES, REASONING WITH RIGOR

“Thinking... a discourse the mind carries on with itself.” –PLATO

Thinking—while engaged in reading, writing, speaking, listening, making, relating—is the lodestar of Arbor School. Sometimes the thinking should be fast, involving the simultaneous processing required to be a fluent reader or to utilize number facts to solve real-world problems. But much of the time, thinking should be slow—deliberate and mindful of purpose and perspective, of reasonableness and consequences. We try to teach everything with an eye to its ultimate role in clear, incisive, synthetic and creative thought.

Is there declarative knowledge to master? Yes, of course—the multiple sounds of all the vowels and diphthongs in our crazy language, the multiples of the numbers to 10 and the factors of numbers to 100. And every discipline has its conceptual content that must be internalized to support deep engagement. The teaching staff must adjust the focal length of purposes and practice so as to draw students’ attention now to this part of the whole, now to a larger part of the whole. Our goal is ultimately for children to independently wield the instruments of investigation and expression: sentence craft with proper punctuation and spelling; organizational clarity with evidentiary relevance; operational fluency with procedural reasonableness; understanding of character and plot as well as authorial intent; an appreciation of beauty in all its marvelous variety.



Read further excerpts from The Idea of Arbor School—and purchase a copy, if you wish—on the Arbor Center for Teaching website: <http://www.arborcenterforteaching.org/publications/books/the-idea-of-arbor-school/>

SWIMMING TO THE SEA

AIMS FOR THE PRIMARY YEARS

by Felicity Nunley and the Primary Team

“A journey of a thousand miles begins with a single step.” –Lao Tse

The five and six-year-olds we see entering the Primary years at Arbor School are at the beginning of a long journey. Most of them are at the very start of a life of reading and writing and using numbers. So we have a special job to do. We must make this start meaningful and captivating, real and purposeful. In short, we must make it obvious that the hard work of learning to read and write and calculate is worth their while. Teaching thematically is how we do it.

By embedding our instruction into rich, thematic content, we provide our students a powerful context in which to practice their fledgling skills. A theme acts as a vehicle on which to hang the work of reading and writing and doing math. The children may think they are learning about the astonishing habits of grey whales or the adventures aboard the Mayflower, but the secret is that they are learning to do research and to collect data. They are learning about the mechanics of our written language as they write in journals set in 1620. They are practicing basic addition as they sell pretzels to customers at the Arborfest store.

*Evie displays her model baleen,
made from pond reeds and clay*

A successful Theme makes good use of what Primaries do naturally:



Make and do: Primary students are doers by nature. They are active and learn best by doing. We strive to provide them with many authentic experiences: to compare the long, stringy roots of a cosmos plant with the thick, ropy root of the dandelion or taste the toothy crunch of the Mayflower’s staple hardtack. We touch and feel the baleen of a whale, finding precise language to describe its smooth and bendy surface and imagining how to replicate it in a model.

Relish stories: Primaries love stories. They love stories about people they know and love, but they also love stories about characters from faraway places and from long, long ago. They love to be read to, and they love to re-live the stories they hear. During our study of the Greeks, our dress-up area is stocked with togas and lightning bolts, laurel crowns and grapes. When we study the journey of the Mayflower, they take on the characters of William Brewster, John Howland and Rose Standish, imaging their hopes and fears, misfortunes and triumphs. They learn empathy.

Collect: Primaries need big pockets. Treasures are found at every turn: purple berries on autumn bushes, well-formed mud balls, a shiny candy wrapper, the perfect stick. So too they collect facts. The multi-syllable name of an obscure dinosaur, the length of an adult’s small

intestine, or the miles of an Arctic tern’s astonishing migration—Primaries cherish these facts, turning them over in their minds like shiny stones.

Experiment and practice: Anyone who has lived with a six-year-old who is learning to whistle knows that children this age love to practice. They naturally experiment and when they find success, they repeat it and repeat it. They love the feeling of mastery, and as a basketful of perfectly folded paper airplanes can attest to, they love mass production. We capitalize on this impulse, helping Primaries find similar satisfaction in well-crafted handwriting or observational drawing or a math game that never seems to grow old, all the while nudging them to the next level of sophistication.

Think big: The Primary-age child also presents us with seeming contradictions: they love the excitement of a birthday party but relish the comfort of the routine of a “regular” day. They are at once literal and myopic, but also ask big questions: “Where was I before I was born?” “How do you make water?” While certainty can be satisfying, they are also able to handle a surprising amount of ambiguity. It is important not to underestimate the scope of their intellectual appetite.

HABITS & ATTITUDES

A successful Theme also provides opportunities for students to develop ever more sophisticated habits and attitudes:

Expand one’s world view: Exploring one’s immediate environment is a natural instinct in the youngest children. The Primary-age child is ready to expand her horizons and relishes learning about faraway places and the way things are done there—to learn that the tooth fairy is a bunny in China or that traditional Japanese houses had walls of paper. They are interested to learn that Greece is a real, modern country and to try pronouncing the word for watermelon in Greek. Learning that there are many ways of doing things is a powerful lesson to the Primary child, who can, at times, be wedded to current understandings and resistant to change.

Develop wonder and appreciation for the natural world: Hearing the stories of the critters of the natural world and observing them close at hand, children naturally become stewards of the world around them. When turning the chicken eggs in an incubator, keeping a careful eye on the temperature and humidity inside the box, the children are aware of the need for maintaining a healthy environment for the developing chicks. Similarly, after studying whales, the children are incensed to hear about plastics in the ocean and become ardent and vocal activists to protect the health of the seas. At this age, stewardship of place begins to expand beyond their immediate horizons.

Extend the spirit of investigation: By studying subjects that are removed from their own lives by place and time, Primaries are required to develop means of exploration beyond immediate experience to satisfy their curiosities. Students learn to turn to books to look for information, developing such early research skills as

Stella paints a salmon to stuff and hang in the classroom



listening for important information, marking relevant pages, identifying key facts, and practicing basic ways of organizing information.

Whether studying the plants in their backyard or the food of countries half a world away, we hope that Thematic studies awaken curiosity in the students and compel them to embrace the possibilities that the world presents.

THEME IN ACTION

Our study of migrating animals affords particular opportunities to delve into research and collect some truly remarkable facts about compelling creatures. Our Journeys Theme year is largely focused on human stories, from the *Mayflower* to the *Odyssey*, but people aren't the only ones who make journeys. In this unit, we cast our eyes to the sky, the land and the water to investigate and compare the travels and life cycles of salmon, Arctic terns, monarch butterflies, caribou, and humpback whales.

In an initial discussion about migration, we find many children already know that birds and whales travel south for the winter. Some know that salmon swim out to the ocean and return to the stream they were born in years later. We work in pairs to list species that migrate, those that don't, and those we wonder about. We start to collect some astounding facts about champion migrators, such as the Arctic terns that spend eight months a year traveling from the 25,000 miles from North Pole to the South Pole and back again—a journey we work as a class to plot on the world map. This is a chance to admire the wonders of nature, but also to practice listening for important facts in books read aloud and recording them in our own words.



Myles tracks an Arctic tern's journey up the Atlantic coast

We learn about caribou, which travel in vast herds that can spread over 200 miles, and salmon that swim out to sea and then return to the very creek where they were born to spawn. We practice diagrams as “non-fiction drawings,” working as a class and then individually to draw and label the parts of a salmon's body. Children make and paint a three-dimensional stuffed salmon, and in Science they have the opportunity to examine salmon skin and observe the scales under a microscope. We also learn about monarch

butterflies, which migrate more than 1,000 miles to return to the birthplace of their forebears. Students create fact notecards about these amazing butterflies in their own words, practicing their editing skills and use of punctuation.

In the realm of making and doing, we also get to play with scale. Children make dioramas of caribou herds, rendering something large at a tiny scale, and work together to craft an enormous butterfly model using tissue paper. Scale work will form a major piece of their design education at Arbor, being essential for everything from crafting topographical maps of our campus to stitching Robes of Power. It requires children to develop flexibility of perception and attention to detail that enhance intellectual pursuits across disciplines.

Mathematic extensions are particularly rich during this unit, too. We get to grapple with some very big numbers, considering place value by grouping Unifix cubes, tens' rods, hundreds' charts, and other manipulatives and practicing math drawings. We use Unifix cubes to compare the lengths of different creatures' migrations, and we put in some authentic practice with currency when we hold a bake sale to benefit whale research and habitat protection. This year one of our Primary classes built a life-size model of a humpback's 18' pectoral fin and mounted it outside the classroom door, where it quickly became a compelling new unit of measure as the children compared the relative size of objects.

We also turn an eye to migrators close at hand and get to know the birds that visit our campus. We lure them in for closer observation with treats of "birdy bagels" and birdseed-stuffed orange halves and consider the factors that might be affecting our results as we log the apparent preferences of our feathered friends. Apart from reveling in the delight children naturally take in observing the ping-pong antics of a flock of tiny bushtits combing the area for food, we are practicing habits of noticing and thinking like scientists. The birds inspire independent research, too. "A robin eats up to 14 feet of worms in a day," one child shares from her reading. "That's just four feet less than a humpback's pectoral fin!" an excited classmate calculates. It is just this kind of connection—imbued with wonder, investigation, and the relishing of new knowledge—that thematic teaching fosters.



Ben takes some extra time to finish a giant plankton model as Evie reads aloud to him

SKILLFUL TOGETHERNESS

AIMS FOR THE JUNIOR YEARS

by Peter ffitch and the Junior Team

By the time they enter the Junior class as second and third graders, our students have covered considerable ground on their journey toward a life of learning. A sense of wonder still drives their cognitive development, and they are developing quite a sophisticated ability to act on that wonderment. The miles that they have put in as developing readers, writers, and mathematicians during their Primary years have built real strength and stamina. Reading is now a tool for satisfying curiosity, writing a means for refining and expressing understanding, and math a way of bringing quantification and precision to their inquiries. Given this academic and developmental growth, we have designed a thematic curriculum for the Juniors—Change and Continuity in one year and Communities in the next—to fire students’ curiosity in a way that drives them to build, employ, and refine their skills in every academic realm. Juniors are ready to dig for information in written resources that may challenge their reading ability, to work at organizing their non-fiction writing in terms of main ideas, and to marshal all of their mathematical muscle to solve real-world problems.

The Junior curriculum is also built on the premise that these children learn well by doing—that lasting knowledge and understanding will likely come from meaningful work that calls upon that understanding. To this end, we require that Junior students be makers and builders. As we design units within the thematic structure, we look for opportunities for the students to design and build models and to employ their developing skills in completing real-world projects. Whether taking weekly stream-depth measurements to gather data points that will show change over time or building a boat to encounter challenges that faced the Corps of Discovery, our students have experiences that support them in becoming poised in the world. Real tools and real problems—work that demands the application of all of the habits, skills and knowledge that each child can bring—are fundamental to our curriculum.

As we move through our two-year thematic cycle, we seek to spark active wonderment and questioning, to hone observational skills, and to build independence in satisfying curiosity and expressing understanding. We seek to ground this work by nourishing within our students a sense of place, a devotion to that place in the practice of stewardship, and an understanding of the concept of community, both within our classrooms and beyond our borders.

Sense of Wonder

It is our belief that a deep understanding of the familiar can serve as a basis for wondering and learning about the unfamiliar and different. To this end, we use the Arbor campus as the initial focus of our geology studies, seeking to ask and answer questions about the Earth’s structure by first digging down into our own dirt. We work to understand the universal elements of weather by observing and measuring the atmospheric phenomena that we experience every day. We become Lewis and Clark’s Corps of Discovery by exploring and mapping Arbor’s woods, and we taste the hardships of the Oregon Trail by pulling our own wagons through the mud and across the creek. These direct experiences provide opportunities for children to ask and answer their own questions, make their own observations, and carry out their own experiments. And these thematic units combine well to drive the acquisition of scientific and mathematical skills and habits while also building a deep understanding of place.

Harmony

The concept of community is significant in the life of the Junior student. Each year, as new students join the class and returning students move into leadership roles, we act intentionally to form a productive learning community. In such a community students must be kind to one another, accept differences between individuals, learn from one another, sit closely, speak thoughtfully, work through interpersonal problems, take care of common spaces, accept mistakes, look for good in one another, celebrate triumph, console each other in defeat, work in large and small groups, and work together toward shared goals. Accomplishing all of this with grace, skill and humility is a tall order for any adult, but it is the ideal we cultivate and tend with our seven- to nine-year-old students. As we work at building our own community, we are primed to examine other communities and to explore what binds and sustains groups of people. To this end we study the Native Americans who first inhabited our region, we learn about Native American communities in other geographic areas to look for the ways in which place influences culture, and we learn about the groups of Europeans who fueled westward expansion.

HABITS & ATTITUDES

Community: We are together as pairs, trios, table mates, grade mates, whole classes, and grade levels. All this togetherness requires intention and practice. What kind of classroom will support all of our learning styles? How do we share and tend our beautiful campus? How do we resolve disputes? Juniors must come to shared answers to questions like these as they take on the hard work of living in community. They are not perfect at carrying out what they know to be good community behavior, but they know when things feel right within a group of any size. Junior days are the days of being old enough to care and thoughtful enough to make a difference.

Collaboration: Junior-age children are at something of a developmental crossroads, at times reveling in close work with their peers and at others wishing just to be left alone to produce something wholly their own. We provide opportunities to practice both independent work and collaborative work, seeing both as necessary modes of the effective student and the successful adult. Learning from others and being able to communicate one's thinking are habits that remain valuable for a lifetime. When we ask students to work in groups, we acknowledge that we are asking them to accept a challenge. If a project is truly engaging, it can be hard for an eager student to refrain from forging ahead in a solo effort, so we make explicit our goals of collaborative effort. Likewise, playing together well brings its own challenges. We ask our students to be inclusive, to follow as well as lead, and to practice the flexibility that will allow them to resolve disputes without adult arbitration.

Quality: Observing prose conventions and using neat handwriting are the paper equivalent of clear speaking. Juniors begin to live in the world of editing and revision, a cycle that applies as readily to mathematical and design work as to written work. They are now able to consider their work as in progress, meant to be revisited until all the words are spelled correctly, all the sums add up, or all of the parts work as intended.



Juniors Will and Grayson tending the class guinea pig

Everyone knows that a “last look” is the final step for all work that is to be shared. Students learn to consider effective communication with an audience; peer responses become invaluable in driving revision. With practice, this tending of all written work becomes second nature for Juniors; they begin to internalize editing as part of the writing process. Juniors’ mathematical, scientific, and design efforts begin to show increasing attention to detail, too, as they record math thinking and refine observational detail and tinker with models.

Scaffolded Independence: Junior students are seeking independence as learners, and we are committed to helping them attain it. We may do so by teaching and practicing discrete skills and parts of processes; we may do so by involving students in the design of projects that will demand their resourcefulness in applying what they know and in learning what they still need to know. When the work is worthy, Junior students drive this process.

Stamina: The Junior author often dreams big. “I’m going to write a story that will fill this new notebook!” says the child, as she begins numbering each page. As Junior teachers, we know that few of our students actually have the stamina to produce such a work, but we aim to help them build the muscles that they will need to do so in the future. These same muscles will help them persist in trying to find all of the possible answers to a math problem, and even when a sustained physical effort is needed to saw completely through a board. Our students know that we value effort and persistence in the pursuit of worthy goals.

THEME IN ACTION

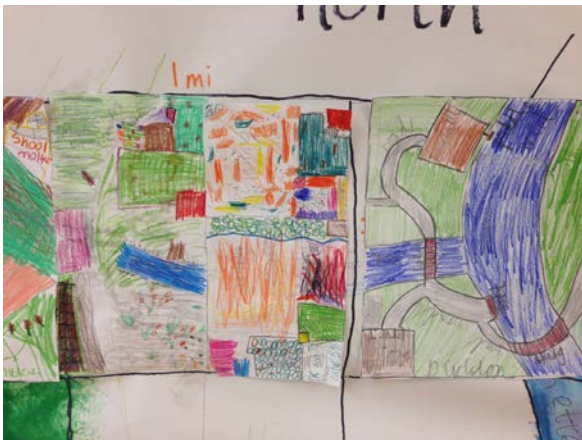
The thematic curriculum and the social curriculum sometimes intersect in powerful ways. Junior students are developmentally primed to form alliances, to test hierarchies of leadership, to seek a sense of belonging to a group. The give and take necessary to satisfy those urges without excluding or dominating peers takes deep and thoughtfully guided practice. So it is not entirely coincidental that our Communities theme year takes us from the Oregon Trail to the settlement of our city and includes extensive role-playing of individuals arranging a new community. Taking on the historical character of one of Portland’s original 212 pioneers, Juniors soon discover that people living in community need to cooperate and also to give each other space for independence.

Although a steady stream of settlers had been coming to the Oregon Territory since the early 1840’s, the city of Portland did not really come into its own until the Donation Land Claim Act offered free land to pioneers who arrived before December of 1855.

The surge in population inspired by this opportunity meant that all of the land within the 100 square miles of our city was claimed and we can trace the title to every single piece of property in Portland back to the first owner. We learn about the challenging work of surveying this rough and heavily timbered country in preparation for settlement, learning some local geography in the process and revisiting the use of cardinal directions. The Juniors work together to make a large map of the original township and mark the 36 mile-square sections that are still bounded by our major streets and avenues. We read about the occupations of the first 212 landowners and get to know some of the founding fathers as characters.

Each Junior selects an occupation from amongst those that existed in 1850, and soon we are a settlement’s worth of lumberjacks, teachers, farmers, blacksmiths, doctors, millers, and ferrymen.

We Claimed This Land:
Portland’s Pioneer Settlers,
by Eugene Snyder, is our
primary resource for
information about the
city’s founders.



Each settler goes through the process of staking a claim to a piece of land well suited to his needs and begins keeping a journal of daily activities. The negotiations begin right away, since those harvesting timber or produce need roads to the river to take their goods to market and must necessarily cross others' property. And everyone needs access to the ferries, the schoolhouse, and the downtown area. Students collaborate to devise advantageous clusters of related businesses, the better to attract customers. Studying historical documents of the time, we find early publications advertising the choicest features of the new city—sometimes with credibility-straining embellishment—to prospective pioneers back east. We set out to craft a similar newspaper trumpeting the virtues of our own settlement.

Through this work, the children have an authentic chance to put themselves in someone else's shoes, to consider and accommodate others' needs, at considerably lower stakes than they face on the playground. They are seven and eight years old; we do not expect them to draw useful lessons from their Theme studies and apply them directly to their social lives. But consciously or not, they are developing a tool kit that includes skills in negotiation and compromise. They are gaining practice at the give and take that lets a community function and thrive.

I am a sawmill
owner in plot 3
I will have to
catch logs lucky
I have 10 boys
each with a
rope and hook
to catch logs
every day.
However today
is difrent I
will go to J.W.
mwerside
carpentrio



Download the Junior Up
class's 19th-century
rendition of The Oregonian:
[http://www.arborschool.org/
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2014.pdf](http://www.arborschool.org/pdfs/Junior's_Oregonian_2014.pdf)

SCALING UP STAMINA & AGENCY

AIMS FOR THE INTERMEDIATE YEARS

by Daniel Shaw, Eliza Nelson, and the Intermediate Team

The richness of the topics in our curriculum helps buoy two of our main goals for the Intermediate years. Firstly, we challenge students to ask questions. Their natural curiosity quickly brews new and exciting ruminations. Over the course of two years, one centered on Environments and the other on Inventions and Discoveries, our projects attempt to hone such queries into focused and helpful questions that spur research forward and tease out the most salient pieces of information. Secondly, we challenge students to make claims about the topics they study. By the fourth and fifth grade, students can be quite opinionated. We ask them not just to make claims but also to select the most relevant findings from their research to support their stance. The increasing complexity of our curricular material raises the level of challenge and demands growing sophistication in the students' work. In addition to these two overarching goals, we also strive toward the following aims over the course of each year:

Inquiry

- Students will hone research skills as they distill non-fiction in various forms, with particular focus on capturing facts in their own words. Students need to scour works of non-fiction that may contain only a few pertinent bits of information and sort that data to draw connections and conclusions.
- Students should develop focused questioning through the pursuit of complex research topics as well as self-guided experiments in science.
- Students will begin to formulate questions, predictions, and reasonable inferences during fiction reading through reading groups and reading conferences
- Students will continue to engage in and relish generative, open-ended wondering

Expression

- Students move from simply gathering ideas to linking those ideas into a cohesive whole. Fourth and fifth graders are learning to synthesize facts they read and use them to scaffold new ideas.
- Students apply the abstract concepts they study, experimenting with the power of the lever, for instance, rather than taking for granted the formula that it exchanges force for distance. Conversely, they are able to think and talk about force without pushing on something.
- Developing claims and supporting them with evidence is a particular focus in writing. Students must show their ability to synthesize information by connecting disparate facts and linking them to create a unified argument in favor of the point they are trying to make. Learning to craft clear topic sentences and support them with logically ordered information in a paragraph is a crucial step in this developmental process.
- We aim for clarity, precision, and inventiveness in creative writing.
- Revision is one of the most difficult tasks we ask students to undertake. Intermediates are developing the ability to self-assess and know that their best work will emerge from many drafts.
- Students develop an appreciation for language and the writing craft through poetry recitation, weekly creative writing exercises, and group read-alouds.
- Students gain skills and learn new techniques for creative work in Design and Music.

HABITS & ATTITUDES

- Fourth and fifth graders are developing the stamina for sustained attention. Students work toward focusing for an hour at a time on research, math, writing, reading, or design.
- Students practice careful observation as the basis for strong work across the curriculum.
- As students get older we expect them to be more independent and better able to manage their time. In the Intermediate level they are particularly primed for a leap in ability to work on their own at school and at home, starting work periods quickly and asking questions that help them move forward. Through open-ended projects, students learn to decide for themselves when they have accomplished their best work.
- Students should be able to determine when they are confused and should possess strategies to move forward in the midst of such confusion, both independently and through thoughtful questions put to teachers or peers.
- Students can actively participate in group work and ensure that their voice is heard while developing the flexibility to accept others' ideas and build upon them.
- As students develop tenacity, stamina, and skills, they become more comfortable with hard work. They become more confident that they can solve tough problems.
- Students should engage in frequent reflection to inform independent goal-setting and begin to develop agency in directing their own learning.



Intermediates on a field trip to the Oregon coast

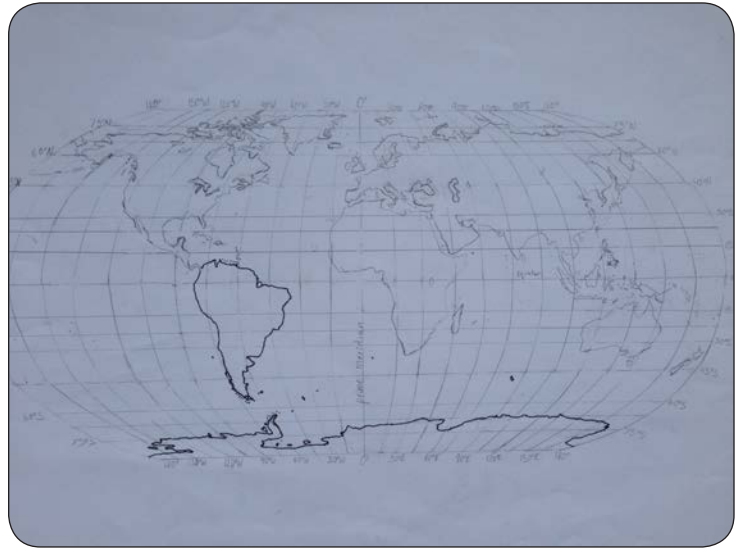
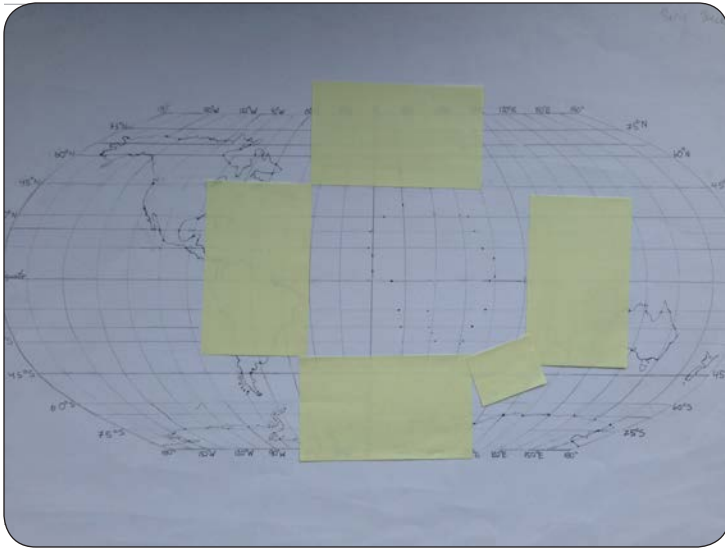
THEME IN ACTION

The ability to focus on a project for lengthy work periods and to carry over purposeful and fruitful effort from one day to the next is tested and regularly fertilized in the Intermediate years. There may be no greater example in our curriculum of what 9- and 10-year-olds can be called to achieve with respect to sustained hard work, tenacity, synthesis, and skill than the world mapping project of the Environments theme year.

The unit opens with an opportunity for critical thinking and question-posing as we consider the different projections that humans have devised to map a three-dimensional globe on a flat surface. “How do you *make* a map?” one child wanted to know—a profound conundrum indeed, particularly when we think about the millennia of map-making before aerial photography and the present danger to mariners sailing an imperfectly represented coastline. And how does the purpose of the map affect the choices of the mapmaker? Gores most faithfully preserve the relative size and shape of landforms, but it’s difficult to use a segmented picture for navigation. Every student must weigh the advantages of different projections and select one to render herself.

We wrote extensively on the Intermediate world maps in our very first Cambium issue, “Mapping.” Download it here: <http://www.arborcenterforteaching.org/publications/cambium/>

The maps we make for this project are physical, not political, and serve as expressions and extensions of students' learning about climate patterns. Each child has done extensive research on a world biome, and now she can see how geographical features influence the transition of one biome to the next—how grasslands about mountain ranges; how forests are temperate or tropical based on their distance from the equator. There are plenty of political wonderings as the work proceeds, however, and students often pull out an atlas to satisfy their curiosity about the landforms they're drawing: "Wait, *that's* New Zealand?" There is nothing like painstakingly crafting a map of the world to solidify and correct understandings about geography.



Maps in progress. Ava's whole map has been approved to proceed to permanent marker. Note Berit's isolation of the continent she is drawing and her advance plotting of notable features of Africa's coastline—these are great strategies for preventing errors.

Beyond content knowledge, students gain and hone sophisticated skills in grid work and precise observational drawing as well as practicing chalk pastel blending techniques. They must competently pinpoint geographical features—mountain ranges, lakes, rivers—using latitude and longitude, laying a sturdy foundation for working in the coordinate plane in mathematics. They have ample time to internalize the importance of revision for accuracy, checking their work on every continent with a teacher before they proceed. Almost everyone will experience the frustration of discovering that a painstakingly rendered coastline is situated 10 degrees away from its actual location and will develop a toolkit of strategies for correcting such errors. Simply finding a chin-up attitude in the face of such setbacks is laudable; recognizing and drawing on a growing ability to solve tough problems is one of our great goals for Intermediates.

Drawing a map by hand from a base map at a different scale is a laborious process. It takes months of time interspersed with other projects. Working efficiently, picking up where they left off and making the most of an hour of time, is just within the grasp of students this age. Through long-term projects like the world map they are building stamina and focus to carry themselves forward independently, determining what is next to be done and taking action. This ability will be critical to support their work on such major undertakings as self-designed scientific research, the Senior production, and ultimately the year-long Senior Project.

"I think I'm going to make a new world map," one Intermediate announced at the dinner table. His family was astonished, as he had spent more than eight hours working on his current iteration that week alone and was nearly finished. But his teacher had shown him some wild modern projections—heart shaped, butterfly shaped, foldable back into a globe—and his mind was on fire. Whether or not he undertakes such a massive independent project this summer, we delight in that tinderbox wonderment.



Wenwen works on her equal-area projection. Below, Jed pencils in the Arctic.





ARBOR SCHOOL
OF ARTS & SCIENCES

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INNOVATIVE K-8 CURRICULUM FROM THE ARBOR SCHOOL OF ARTS & SCIENCES

THE ARBOR CENTER FOR TEACHING AT
ARBOR SCHOOL OF ARTS & SCIENCES

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Cambium: (n) the cellular growth tissue of trees and other woody plants, from medieval Latin “change; exchange.”

What content would you like to see offered in Cambium? Do you have ideas about how we can improve it? Send us an email: cambium@arborschool.org

Masthead by Jake Grant, after an 1890 botanical illustration.

The Arbor School of Arts & Sciences is a non-profit, independent elementary school serving grades K-8 on a 20-acre campus near Portland, OR. Low student-teacher ratios and mixed-age class groupings that keep children with the same teacher for two years support each child as an individual and foster a sense of belonging and community. An Arbor education means active engagement in learning, concrete experiences, and interdisciplinary work. For more information on the Arbor philosophy, please visit www.arborschool.org.

The Arbor Center for Teaching is a non-profit organization created to train teachers in the Arbor educational philosophy through a two-year apprenticeship while they earn MAT degrees and licenses, and to offer guidance to leaders of other independent schools. In 2007 its mission expanded to include the publication of material underpinning the Arbor School curriculum.



Intermediates atop a fort

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