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Cambium

INNOVATIVE CURRICULUM FROM THE ARBOR SCHOOL OF ARTS & SCIENCES

ARTS AS CORE CONTENT

Arbor School was founded with the goal of inspiring students to constant inquiry and expression with attendant absorption. Every expressive realm offers chances to bring curricular content to life, so the performing arts, the visual arts, and writing are all exploited to engage and enhance student understanding. From the outset, we have referred to all of the modes of visual expression as *design* rather than just *art* so as to connote problem solving and planful execution of a vision.

For some children, design is a primary expressive domain. Writing is hard work, especially for young children. It is still out of reach for some of our kindergarteners. But in the past few weeks, Primary teacher Felicity Nunley has watched one of her pre-writers embrace a study of caribou by deftly sculpting the animals in clay. A pair of her classmates used wooden blocks to construct a much larger caribou: "Oh, look at this curved block! This could be part of the antlers." "Yeah, that's perfect for the antlers! I'm using these squares for the hooves." Simulating the sound of an approaching herd by patting and then drumming on thighs and floor creates an analogy with more impact for our youngest students than recording statistics of the vast migration ever could.

As they grow in sophistication and ability, we believe it is essential for our students to continue to observe and make sense of the world through drawing, rendering, and performing. Our Seniors in sixth through eighth grades have reached the age at which many young people turn away from artistic expression, having become more self-critical and finding themselves no longer able to render what they wish to render. If we teach them the skills to do so and introduce new media to explore, those avenues need not close.

Above all, design offers ways of getting inside—inside a culture, the cognitive processes of the brain, the developing self, the timeless human spectable, the life of an explorer. Design and drama can harness the power of narrative, whether in literature and myth or in more recent history. It can lead young students forward in imagining foreign states of mind. It can even guide them in organizing and cementing their understanding of complex topics in science. In this issue, we suggest that it is not necessary to be an art teacher to bring design forward as a mode of expression in your classroom. We hope you will download the accompanying support materials and try your hand at a portrait, a Brain Box, or even a Greek play.

In this issue

ARBOR SCHOOL
OF ARTS & SCIENCES

WHAT COULD BE WONG WITH SUCH WUV?

FORMAL AND INFORMAL ROLE-PLAYING IN THE PRIMARY CLASSROOM

by Felicity Nunley and Lori Pressman

"I see J1! I see J1!"

It is early morning in the Primary classroom and Abe and Maddie are in the whale research lab that has been set up in the block area. Cardboard tubes are taped to cereal boxes to serve as telescopes. The children type at computers made from shoeboxes and a discarded keyboard. On the cardboard monitor, they have drawn a picture of an orca; with a few quick maneuvers of the wine cork mouse, they identify it as J1, the patriarch of a resident pod of orcas in the San Juan Islands that we read about yesterday. At work in the lab, Maddie's and Abe's excitement is as palpable as any "real" whale watcher's.

Throughout their days at Arbor, students have many opportunities to try on roles both formally and informally. Role-playing is natural and spontaneous to the five- and six-year-old child. At recess, elaborate narratives are spun as they become mama kitties and lost orphan kitties. When this energy is invited into the classroom, Primaries readily become whale researchers during Choice time, integrating the information they have learned in class. We hear them in the whale lab discussing the whale they have sighted: "I think it's a humpback! No, wait, it can't be a humpback. It has teeth!"

A child's natural inclination to play and assume roles is a powerful device for enlivening curriculum, making content meaningful in personal and authentic ways. By stepping into a role as someone else, students can imagine how things might have been long ago and far away. Primaries learn to identify with characters in history when they are assigned roles of actual passengers as they study the Mayflower. Nor do they abandon role-playing after the Primary years: as Juniors they become members of the Corps of Discovery, experiencing the impulse of an explorer, eager to see what is around the next corner as they battle the blackberries in the woods to chart a remote corner of the campus. They travel the Oregon Trail as pioneers, budgeting for the purchase and weight of supplies and reenacting the fording of rivers and the scaling of passes with red wagon prairie schooners. As Intermediate fourth and fifth graders, they will become denizens of a 12th-century European city to explore the effects of power and privilege (or the lack thereof) on daily medieval life.

Every two years in the Primary classrooms at Arbor, role-playing is formalized at a new level as we prepare a theatrical production of a retelling of The Judgment of Paris, a dramatic tale of jealousy and problem-solving set among the Greek gods and goddesses of Mt. Olympus. We begin by preparing the students with an introduction to the Greek pantheon. As a class, we read the stories of the Greek myths and learn the biographies of the players, each child compiling a book of 12 gods and goddesses with a few simple facts and illustrations. Naturally, the kids begin taking on these roles during recess and Choice times as they pull out togas and thunderbolts from the dress-up box. Enterprising runners tape feathers to their sneakers in the style of Hermes. Athena straps a stuffed animal owl to her shoulder.

Two years ago we were fortunate to have a teaching apprentice with a background in the classics and a desire to lead our students deeper into those ancient, enthralling tales. Jenny Lowe Cook remembers her transformation into Homer the bard:

Here is what some would call a gamble: teaching ancient Greek epic to modern day kindergarteners and first graders. Homer's Odyssey *is so ancient, so thoroughly*

We set up inquiry stations for each new unit by brainstorming with the children what tools we might need to become whale researchers, entomologists, passengers on the Mayflower, or whatever our studies require. The Primaries are quick to leap into construction mode in our "junk box" building area, and the subsequent play at the inquiry station is self-sustaining.

D'Aulaires' Book of Greek Myths, by Ingri D'Aulaire and Edgar Parin D'Aulaire, is a favorite resource.

foreign; with its warriors, monsters, deities, and very hard-to-pronounce names, what on earth is the use of telling it to such young children? Won't they be confused and bored by it all?

I had grown up hearing stories of the Greek gods and goddesses and the retelling of the Trojan war from both the Greek and Trojan perspectives. I had read Homer and Vergil and loved those epic stories dearly. Ever since I had heard that Arbor Primaries devoted a part of their year to studying the Greeks, I was excited to teach that part of the curriculum. But the Fates, it seems, had different plans. I ended up teaching oceanography to the Intermediates while the Primaries were studying the Greeks and getting ready to perform their play about the legend of the golden apple. I wanted to stay involved and share my knowledge of ancient Greek mythology, but could only find one hour a week in my schedule that would work. Laura Frizzell graciously gave me that hour of her music time with the Primaries to tell stories instead.

I decided to tell them the story of the Odyssey, all about Odysseus's wanderings and misadventures in trying to get back to his native Greek homeland after the fall of Troy. I used an excellent picture book retelling by Geraldine McCaughrean and Victor Ambrus as my guide to remind me of the many stops that Odysseus made along the way.

I'm not sure when in the process inspiration struck me to dress up as Homer and to tell the story as a bard. I knew that I had to keep the 36 Primaries engaged and interested for about an hour of storytelling, and as I discovered, a few props go a long way. I assembled a small bag of shawls and fabric scraps, found a zither-like instrument in the storage attic, and fashioned a chiton of sorts from an old red bedsheet. I wrote myself a Post-it note of highlights to aid my memory and kept it in the palm of my hand, just in case the Muse of good memory left me stranded! I remember sitting there on a little stool shivering in a red bedsheet and strumming an outrageously out-of-tune toy zither while the Primaries filed in slowly and sat wonderingly before me in the Arena. I was no longer Jenny the apprentice; I was Homer the bard.

I wasn't sure how they would react to my costume; in fact, I wasn't sure how they would react to any of it! Even with my props and my pretense, would they just lose interest? In those few moments of waiting for everyone to settle down, I experienced a wave of stage fright. I had found these stories fascinating as a child, but maybe that was just because my father is a classicist! What if these stories were going to go over their heads? But looking at their eager and expectant faces, I realized that once upon a time, there were little children who had sat at Homer's feet listening to his stories, too. I launched into my invocation of the Muse, and she must have heard my cry. The children sat spellbound and listened to the first part of the story for the rest of the hour. I occasionally chose some of them to be actors and participants in my story, perhaps giving them a prop or draping them in a shawl so that they could get into their role. Sometimes I whispered in their ear the "lines" they were supposed to say; other times I just stood behind them and said it for them, and guided them around the "stage". I marveled at their cooperation and eagerness to be part of the story, even though they quickly saw that it was not their chance to reinvent the story. They were content and excited to become living props, and sometimes I would hear them bragging to each other as they returned to their classroom, "I was Odysseus today!"

I often began by asking for someone to sum up what had happened in the prior week's storytelling session, and I was amazed how many hands flew up into the air. Their recollection of the details of the story was impressive. That's because visual storytelling is so powerful, and especially when the children are given the chance to be inserted into the story, for however brief a moment. The story unfolded episodically over eight Fridays and by the last one I was sorry to bring the story to an end. But the beautiful thing about working with children is that their imaginations never come to an end; even when one story is finished, they are always ready to begin with a new one of their own.

The Odyssey, *written by Geraldine McCaughrean and illustrated by Victor G. Ambrus, is now out of print, but many of McCaughrean's tellings of the Greek myths and legends should be available in your library.*

Studying the myths and literature of the ancient Greeks offers a chance to help young children grapple with some of the most powerful themes in human life. What does it mean to be a hero? What are the consequences of acting in greed, rage, or jealousy? How can we stay faithful to the people we love?

For many of our students, Jenny's gentle maneuvering and whispered prompts constituted their first experience as actors. But young children, including pre-readers, memorize lines quite facilely; some of our Primaries have been known to memorize the entire play during home practice with their parents. The script for "The Golden Apple" was written by two Primary students ten years ago and has enjoyed several stagings over the years. Each year the script is altered a bit to accommodate the make-up of the class. A comic role for Dionysus was written in one year and replaced by a musical Apollo the next. At this point, the tradition of the Greek play carries its own momentum. The whole school anticipates the production and is nostalgic for those days as Helen of Troy or Aphrodite. Ask any Arbor Senior who he was in the play; he will not hesitate in his reply and might even offer a line or two.

Max Ball, Norris Meigs, and Holden Clausing-Hufford as Greek gods in 2008

When we are ready to launch our more formal production of "The Golden Apple," the first job is casting. The assignment of roles has been done in a variety of ways, from drawing sticks from a bag for chance assignments to careful, intentional teacher decisions. In either case, there is an opportunity for students to stretch themselves. A student may have a chance to get to know a character he already identifies with in greater depth. After playing Hestia for weeks in the dress-up corner, Peach got to perform an idealized Hestia on stage, batting her eyes as she swept the hearth in domestic bliss. The casting can also be an opportunity for a student to try on a persona that is distinctly other than her own. Purposefully, we have assigned the role of angry, jealous Eris to shy and retiring students, challenging them to develop a strong voice. As they embody the goddess of discord, the students learn to assert themselves in uncharacteristic rage. Similarly, the play offers a new situation in which students can challenge themselves and find success. In class, a child might be a struggling and reluctant reader. Cast as a narrator of the play, he can rise to the challenge of reading and learning many lines. In some cases, the voice discovered on the stage will never recede into quiet again. The memory of Bea belting out her lines has officially made obsolete the impression that she could only be a shy and quiet girl.

Through the play, the children get to experience that many hands really do make light work and that everyone's contributions are important. Everyone has a job, the completion of which is critical to the success of the play before a real audience. Lines and cues must be learned, props need to be constructed, backdrops painted, programs written. The art of being backstage, quietly waiting one's turn to perform, is not the least of the skills the Primaries work to hone.

Even the parents get in on the excitement of the play. Indeed, a mother who is a theater professional first showed us it was possible to direct five- to seven-year-olds in a production of this scale. In the weeks before the performance, parents share their toga-making expertise, consult each other about Greek sandal-tying techniques and laurel crown-weaving tips, and help children rehearse their scenes. We also invite parents to help make spanakopita and baklava for a reception after the play.

On the day of the performance, there is a palpable sense of excitement in the hushed amphitheater as the actors take their places. Some musicians are playing Greek incidental music; the columns with their pizza-box Doric capitals are standing almost straight. The audience is rapt as the wiggly-toothed actors deliver their lines. Finally, we get to the ominous conclusion of the play—the forbidden love of Helen and Paris. With great emotion, our Hermes asks, "What could be wong with such wuv?"

The script for "The Golden Apple" is available for download at http://www.arborschool.org/pdfs/GoldenApple.pdf.

WESTWARD WITH LEWIS & CLARK
JUNIORS JOIN THE CORPS OF DISCOVERY

by Laurel Glasmire and the Junior team

Second and third graders—called Juniors in their mixed-age classes at Arbor School—most naturally learn history through imaginary play. In the year of thematic curriculum that brings them to study communities—specifically the peopling of North America and the interaction of different groups of people with the natural environment and each other—we make heavy use of role-playing as a device to carry children deep into the historical content. With guidance from historical sources, young children can readily imagine how their lives would have been different in times past and begin to understand the contributions of people who lived long ago.

To this end, our Juniors imagine themselves into the Corps of Discovery, that adventurous group of men and one woman led by Captains Meriwether Lewis and William Clark and tasked by President Jefferson to find a water passage to the Pacific Ocean in 1803. As it happened in 2008, Arbor School had recently made a land purchase to expand its campus, creating an authentic context in which our students could take on the roles and responsibilities of charting newly acquired territory. Two years later, we find the experience is no less potent. The Juniors explore pathless sections of the woods, exclaim over evidence of beavers at work, and consider the familiar creek with fresh eyes as they calculate its width and accurately map its course. In asking our students to become the Corps of Discovery, we require them to practice key scientific skills: observing, collecting and recording information, making scientific drawings. We want them to acquire practical orienteering skills such as using a compass, pacing distances, and making maps to scale. We also want them to think about the camaraderie and cooperative relationships that existed among these explorers and about the traveling community they created during their long and treacherous journey.

Lewis & Clark's story and contributions are of particular importance in Oregon, but any history of exploration with local significance could be investigated by this model if there are sufficient resources to set the scene and allow students to imagine the details.

In the absence of a rural campus like Arbor's, the physical journey could take place in a public park. Parent involvement is crucial so that students can travel in small groups with an adult, and so that each child arrives at school on the day of the journey with appropriate attire and supplies. Our Juniors prepare a packing list to take home to parents the week before the excursion.

Roles:

Sydney Stevens's *Q is for Quicksand* (see **Resources**) gives brief biographies of the members of the Corps. We use these to assign roles to our Juniors.

We begin by discussing who the famous Meriwether Lewis and William Clark were and describing what they contributed to Oregon's history. We read aloud excerpts from several books describing the Louisiana Purchase and President Jefferson's desire to map and chart this new territory. We show students a map of North America from 1801, pointing out the newly acquired land, and hark back to previous Native American studies to discuss the people living in these areas of North America.

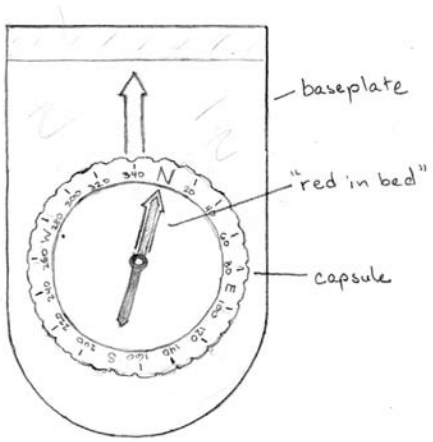
Next, we reveal that the children will become the Corps of Discovery and will chart the wooded territory around Arbor's creek just as Lewis and Clark would have done. We read aloud the mini-biographies of the Corps members (each bio is only one or two sentences), and after each we pick a student's name out of a hat and hand him his new identity.

We find it necessary to ignore genders since there was only one woman in the Corps of Discovery. We have ended up with a male Sacagawea while female students portrayed Joseph Fields, Jean Baptiste Lepage, and other male members of the Corps. The children understand the reasoning and readily accept the decision.

Since the unit outlined here focuses on creating an expedition rather than on the specific content and experiences of the Corps of Discovery, it is essential to supplement with novels, non-fiction texts, and age-appropriate reading for students to listen to and read during Quiet Reading times. Roland Smith's *The Captain's Dog* is an especially good read-aloud to provide historical background for the students' make-believe. (See **Resources** for other suggestions.)

Foundation skills:

Using a compass: Science teacher Jane Lindquist instructs our Junior students in basic navigation with a compass. The concept of declination by latitude is too complex for



A compass heading to travel 340° North. The red magnetic arrow points north; the baseplate arrow shows the desired direction of travel.

Remind students to hold the compass flat and away from metallic objects.

children of this age, but our second and third graders are able to practice finding the four cardinal directions and using the degrees of a circle marked on the compass. Jane's mnemonic is "put Red to bed," that is, turn the compass so that the red magnetic needle hovers above the large North arrow. Then students adjust the capsule ring to point the arrow on the baseplate in the direction they want to travel, "put Red to bed," and choose a landmark to walk toward as the baseplate arrow indicates.

Pacing: Students work with a partner to practice measuring their paces over a 100' distance, which we mark with cones on the soccer field. A pace is two strides; thus the count is made only when the right foot steps forward. Discourage students from taking longer-than-usual steps. For children, about 25 paces will equal 100'.

When you are hiding the chest and writing the instructions, be sure to convert your own paces to account for the children's shorter strides.

A good way to assess mastery of the compass and pacing is to stage an outdoor treasure hunt for small groups to complete. Jane buries a "treasure chest" somewhere on campus, then writes a string of instructions to find it: NE 40° 200'; W 280° 100'; N 340° 50'. Several sets of instructions allow groups to start at different points and converge on the treasure. Each group uses their knowledge of the compass and their 100' pace to follow the directions. They plant a Popsicle stick in the ground where they calculate the treasure ought to be. Jane considers the treasure "found" if students arrive within 100 feet of it, but some teams ask to start again and try for even greater accuracy.

If you have time, let the students solve the problem of how to cut and tie a rope that will measure exactly 10' between the stakes. Make sure there is plenty of extra rope on hand, as some groups will cut a 10' length without allowing extra rope to tie the knots.

Surveying: A more accurate way to measure distances, particularly over rough ground, is to build sets of two stakes connected by exactly 10' of rope. Two children stretch the rope taut between them, then the rear student brings his stake up to the mark of the leader and the leader moves ahead another 10 feet. A third child can record their progress by tallies. This approximates the historical use of a device called a two-pole chain, which teams of surveyors used in mapping the western United States until the steel measuring tape was invented in the early 1900s.

Goals:

Our school director, Kit Hawkins, wrote an adaptation of Thomas Jefferson's original letter commissioning the Corps of Discovery to set forth the goals of the expedition for our Juniors. (She also appears as Jefferson to read the letter aloud to the class—role-playing need not be for students only!) In preparation for the journey, each student creates an Expedition Journal and copies into it the following assignment:

1. Make a detailed, scale map of the course of Saum Creek. Record the direction of the current and the stream's width. Find a foot passage from south to north.
2. Take careful and neat notes so that future generations can read them.
3. Collect and describe plant life, looking for familiar and unfamiliar plants.
4. Look for and record evidence of animal life in the area.
5. Observe and record the weather, general mood of your expedition team, sounds of nature, and any interesting occurrences throughout your time in the woods.
6. Find your way along Saum Creek to the new northern territory.

Into the Woods

We divide the students and adult volunteers into their groups and make sure they all have appropriate shoes, clothing, water, and food for the journey, as well as their

Expedition Journals, pencils, clipboards, measuring devices, and compasses. Each adult receives his or her own copy of the Expedition Goals, then leads his or her group to a particular starting point.

Before the exploration begins, each adult reads aloud the mission tasks again with the group members. Each group should try to meet every goal; it is fine if a group specializes in an aspect of the project that intrigues its members, such as scientific drawing, investigation of animal signs, or mathematical calculations. Teams begin exploring the terrain, following the water route or heading in the direction of their destination. As students travel, they use their measuring devices (surveyor's rope, compass, and pacing) to record the distances traveled, the location of key landmarks on the map, and particularly the course of the stream. Throughout the exploration, students stop often to listen for animal life, identify plants, or make mini-sketches and written observations of the land.

A page from Lola's Expedition Journal as William Bratton. Below, three Corps members measure the width of the creek.

We spend about three hours in the woods, stopping for a snack and bathroom break and gathering together at the finishing point to eat the lunches we have carried with us. The children also spend time after lunch writing about the day, what they have seen, and the general mood of the Corps upon arrival at their destination.

Back in the Classroom

Using their notes and sketches, the students imagine the entire route from the starting point to the destination. We ask them to work individually on a well-labeled map of the path of Saum Creek, with any recommendations for a foot route along the way. Students should note any boggy areas, natural bridges, or impassable brambles on their maps for future foot-travelers. We remind students of the mission tasks to help them create the most detailed maps they can.

For a culminating report, we pass out sheets of 11" x 17" paper for each student. They divide their sheets of paper into four quarters labeled "Map," "Animals," "Plant

Field Notes:

In our experience, one group was particularly excited about making very accurate measurements of their route and labeling their maps precisely. Another group focused on noticing and describing signs of animal life (woodpeckers, beavers, dens, footprints, scat, fish, ducks). Yet another group wanted to describe, record, and collect samples of various plants; they pressed leaves and grasses into their journals to bring back to President Jefferson. Be sure to explain to your adult volunteers that this expedition should be organic, flowing from the students' interest and excitement. As long as the key goals of observing, collecting and recording information, measuring, and exploring are fulfilled, the path may be different for each group. Be sure to have lots of extra paper, as students will find many things to draw and record.

Katie's (or Meriwether Lewis's) extraordinarily thorough map of the Saum Creek area

Life," and "Observations of the Expedition." Students should refer to their journals to record their discoveries in an organized way. Each glues her map of Saum Creek in the "Map" section. In the "Animals" section, students list the signs of life they observed and also describe two animals they have seen, imagining that Jefferson has never seen those animals before. In the "Plant Life" section, students sketch one or two of the plants they found and give the plants names as Lewis and Clark did. In the "Observations" section, we encourage the students to record notes of the weather, the general mood of the Corps, sounds of nature, and any interesting occurrences during their time in the woods. Once the students have finished this display of their work, we gather as a class to present the information to President Jefferson.

Lola's final journal entry as William Bratton embodies the spirit in which we undertake historical role-playing. She imagines the end of the Corps's adventure:

"Today we started to head back to our starting place in Saint Louis Missouri where most of our families are going to be sobbing in delight to see us alive. I feel bad for Meriwether to have no family to see when he gets back, but at the same time I feel sad to leave the journey at a stopping point forever but hopefully somebody else will pick up where we left off."

The Arbor Juniors will indeed pick up where they left off—as pioneer families traveling west on the Oregon Trail.

Explorers pictured: Harrison Chandler, Sarah Hall, Emilio Gray, Emerson Donohoe, and Elise Hudson.

Resources

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– http://www.lewis-clark.org/content/content-article.asp?ArticleID=1492 offers a thorough explanation of the Corps's surveying techniques.

BRAIN BOXES

INTERMEDIATES DESIGN AN UNDERSTANDING OF THE HUMAN BRAIN

by Fran Hossfeld

It has long been an Arbor tradition for Intermediate students to create personal change capsules containing works of self-reflection. Year after year at eighth-grade graduation, the change capsules are returned to their owners to remind them how far they've come in three or four years. The change capsule contains such pieces as autobiographical writing, poems, drawings, letters to the future self, and other personal documents. The change capsule project happens during our study of the human body, a natural time to reflect on our interior worlds. The exterior of the change capsule is a place for students to display understandings about the functions and structures of their brain, which they have drawn on overlays to create a kind of interior self-portrait. While the completed box, with its contents inside, is referred to as the change capsule, the container itself is known as the Brain Box.

Hannah Park at work on her Brain Box. The overlays and lid have not yet been attached.

The Brain Box focuses on learning the basic science of the human brain through a design project. Students draw the brain from many perspectives, read and write about the functions and parts of the brain, create rough and final drafts of writing and drawing, and practice self-reliance when given clear and detailed written and verbal instructions. The unit we teach on the brain asks students to grow intellectually as we study the brain's functions. A sense of each child's character deepens as we make connections to our own brains and how we as individuals learn.

This project lends itself perfectly to the integration of reading, writing, design, and science. We ask students to communicate scientific information while reflecting more personally through writing about their own brains. The success of the Brain Box depends on scientific accuracy, honest personal connections to the subject matter, and a visually interesting and pleasing presentation. While our study focuses on the basic parts and functions of the human brain, we expand our thinking about this amazing organ through focusing on how the brain serves us in our own personal hobbies and day-to-day life. We also take the opportunity to delve into more fascinating areas of the brain through read-alouds.

The Brain Box has photos of the child on each of the five visible sides, showing the child from the front, back, each side, and from a bird's eye view. Using tracing paper overlays to the photos, the students draw the brain from different angles, as it would appear inside of their head. In this way, the drawn and written overlays serve as an x-ray view into each child's brain, providing viewers with visual information as well as knowledge of how it works. With each piece of drawing and writing, the students consider the design of their page in terms of how their audience will receive it. Some questions I ask the students to consider include: *Does the drawing highlight the parts of the brain that you want your audience to pay attention to? Are the labels clear enough for your audience to find and read? Is the information organized, clearly stated, and written in your best handwriting?*

Before students can begin to organize their drawing and writing in a visually interesting way on the final piece, they revise and edit their written work, practicing the process of writing for an audience. With a revised version to copy, students are able to concentrate on the presentation of their work. Using tools like rulers and lined paper beneath the tracing paper, they write in their best cursive italic.

During the Intermediate years, students are introduced to drawing techniques that we use in the Brain Box overlays: "whisper lines"—or very light pencil lines—as they

Step-by-step instructions written for students to construct a Brain Box are available for download at http://www.arborschool.org/pdfs/BrainBox.pdf. References within this article are to particular sections of these Brain Box guidelines.

plan a drawing, modified contours to keep our eyes focused on the object or photograph we are drawing, shading softly and with the side of our pencil, observing and drawing exactly what we see, and drawing from a photograph. The students benefit from many drawing and graphic design demonstrations as well as sharing with one another which techniques—taught or invented—work well for them.

Books to read aloud:

An Alchemy of Mind—The Marvel and Mystery of the Brain by Diane Ackerman

The Brain—The Nervous System by Seymour Simon

Brain Rules—12 Principles for Surviving and Thriving at Work, Home, and School by John Medina

Session 1: Brain Reflection

We begin our study of the brain by asking students to reflect on what they know and wonder. As a pre-assessment, the students draw and label the parts of the brain, write the function of each part, write what they know about memory in the brain and questions they have about the brain. A few of the questions they asked were: *How big is a baby's brain compared to an adult's brain? Why is your subconscious unreasonable? How fast do memories go into the brain? What color is the brain? What part of the brain tells you when you're hurt? Why can you remember so many words, letters, and numbers, but not remember being a baby?* This first exercise ignites the students' curiosity about the brain's appearance and functions.

Session 2: The Brain Map

For an initial introduction to the brain's main parts and their functions, students are asked to read pages 13-20 of *The Brain—Our Nervous System* by Seymour Simon. After reading the article about the human brain, students draw, label, and describe in writing the parts and functions of the brain on their Brain Maps. Using photographs for observation, students draw the human brain from three different perspectives on their Brain Maps. This assignment allows students to practice combining visual and written information on a page in an interesting and clear way. When students are finished with their Brain Maps, it is valuable for them to meet in small groups to compare their understandings about the parts of the brain and to make changes and additions on their own work. The maps can then be taken to teachers for final editing. (See Brain Map Guidelines)

Session 3: Memory Map

for fifth graders

As an optional assignment for the fourth graders who finish the required pieces early, they can use their notes to create a simple Memory Map of their own.

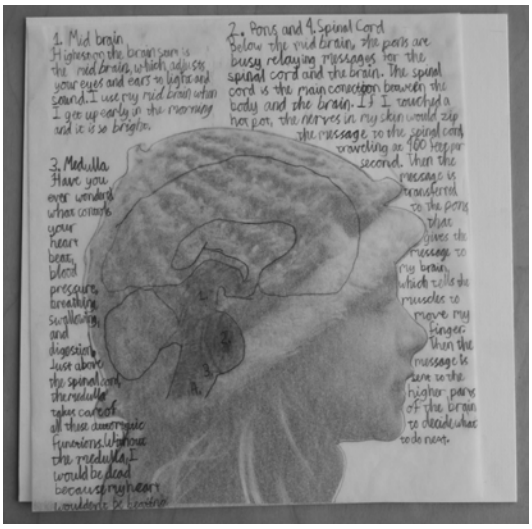
After reading an explanation of how memory works in our brains and discussing the information as a group, students create a Memory Map. This assignment invites students to communicate, through writing and drawing, explanations of the types of memory and students' personal examples for each type. The fifth graders later use their memory maps to teach the fourth graders about how memory works. (See Memory Map Guidelines)

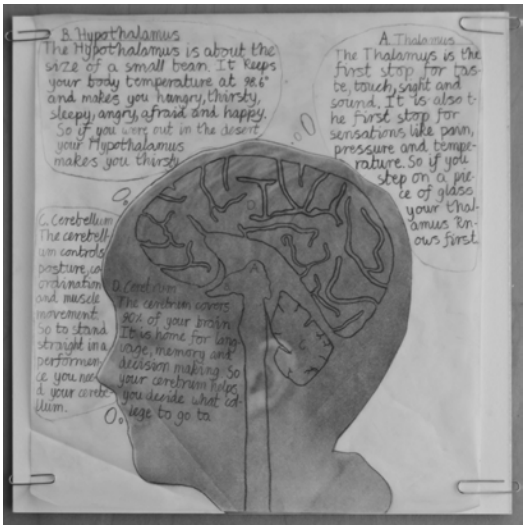
Session 4: Brain Overlay

In order to be ready for students to begin their final drawings in Session 4, a lot of prep work for the sides of the brain boxes must be done. This is a great opportunity to invite parents into the classroom and ask them to help prepare the materials, as described on the following page.

The first overlay is created for the left side of the brain box and includes a drawing and explanation of the cerebrum, cerebellum, thalamus, and hypothalamus. Planning their drawing of the brain to fit perfectly over the profile photo of themselves, the students use a photograph to draw details of the four parts of the brain. Working slowly in whisper lines, the students strive to draw the brain in the size and position that it would appear in an x-ray. Observing the details of the brain photograph, students then work to record each twist and turn of the cerebrum. Students share techniques that help them to draw what they see, whether it is following the lines on the photo with their left hand as their right hand draws or simply thinking of the curvy lines as roads with turns, dead ends, and exits. The goal is to use detail to guide the viewer's eye to each area of the brain that will be discussed on this overlay. Before considering the labeling and describing of each part of the brain, we share ideas and solutions for ways to include writing on our diagram in clear and beautiful ways. Students use their revised Brain Maps to find information on the functions of the cerebrum, cerebellum,

thalamus, and hypothalamus, as well as examples of how each part is used in their own lives. (See Brain Overlay Instructions)





Overlays showing the brain stem (left) and the brain (right)

Session 5: Brain Stem Overlay

The second overlay shows information about the brain stem. Students follow similar steps to those for creating the Brain Overlay, working to focus the viewer's attention on the brain stem area this time and again finding visually interesting ways to communicate information about the parts and how they function in their own lives. The students read about the brain stem and spinal cord, write about the functions of each part in their own words, and provide examples. For this drawing there is less detail in the contours of the parts so we practice our best shading to let the audience know which part of the brain to focus on. (See Brain Stem Overlay Instructions)

Session 6: Memory Overlay

for fifth graders, optional for fourth graders

To create the third overlay, students transform their Memory Map drafts into a final piece. This piece accompanies the photo of the back of the student's head and includes writing about each of the three types of memory and examples for each. While the other overlays show a drawing of the brain, this overlay communicates visual and written information about the memory in whichever creative way the student chooses. (See Memory Overlay Instructions)

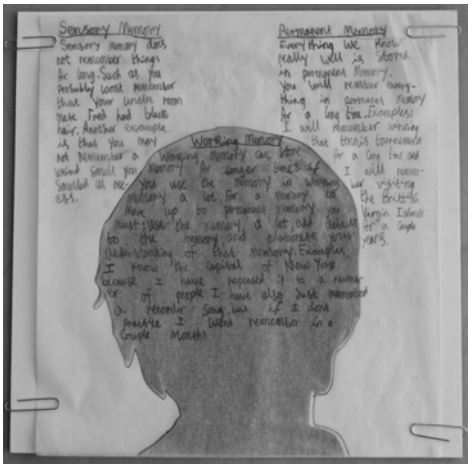
Session 7: Left and Right Hemispheres Overlay

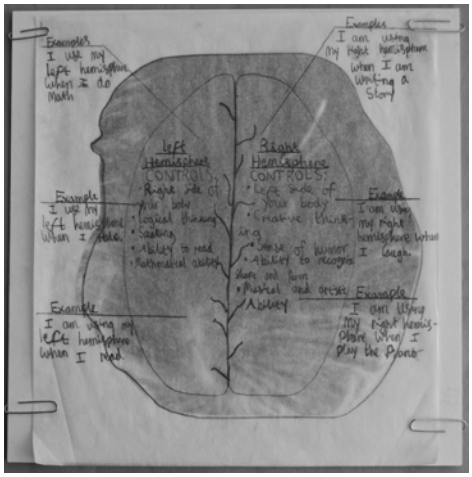
Placed over the photo of the top of the child's head, this overlay teaches the viewer about the functions of the left and right hemispheres. While the drawing for this side is fairly simple, the content invites students to teach viewers about their personalities, preferences, and learning styles. Along with writing about the functions of the left and right hemispheres, students are asked to provide many examples of how each half is used in their daily life. Some of questions we ask students to consider include: *How do you personally prefer to exercise the reading and speaking part of your brain? How do you prefer to exercise the musical and artistic part? Do your hobbies exercise one or both hemispheres? How? Do you feel you can learn best through reading, listening, looking at visual information, creating art, or another way? How*

Parent Jobs:

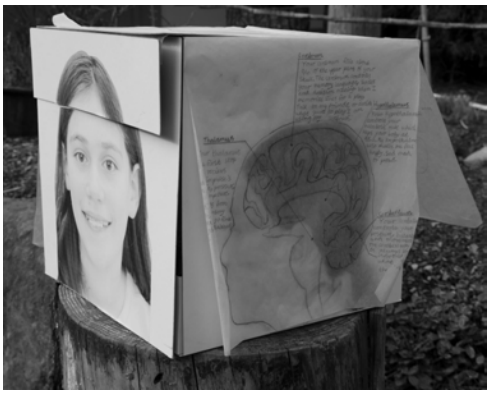
- Taking photos of the students (front, back, both profiles, top of head)
- Printing photos of the students in black and white on 8.5" x 11" paper
- Cutting out each photo
- Cutting white matte board to 10" x 10" (6 pieces per box)
- Cutting 10" x 10" pieces of tracing paper (4 per box)
- Gluing photos onto matte board pieces

Below: Memory and Left and Right Hemispheres overlays





would you describe your sense of humor—what do you find hilarious? (See Left and Right Hemisphere Overlay Instructions)



Session 8: Building the Brain Box

With overlays for the sides, top, and (for many) the back of the Brain Box finished, it is time to put all of the pieces together to create the vessel for the change capsule. After a demonstration, students are asked to work independently using written directions and provided supplies to build their box. (See Building the Brain Box)

Once the change capsule contents have been placed inside the Brain Box, we invite parents into the classroom to view their children's work.

Session 9: Brain Reflection Revisited

To conclude the brain study, students respond to the same questions about the brain that they answered before they began the study. With much more information to relay in this reflection, it is also a great time for them to ask deeper questions about the brain. Students compare their two reflections to make note of their own learning.

Fifth-grade students in particular are developmentally poised to make the most of this unit melding science, design, and personal reflection. On the cusp of adolescence, they are already beginning to consider the self that they know vs. the self that others see. This opportunity to delve into the biological reasons for the differences in our personhood and to express what they learn in a creative and highly personal way can be richly rewarding. The insights the project offers into students' own perceptions can be valuable for the teacher as well.

Brain Boxes by Bea Pickett, Jack Dickinson, Charley Ward, and Mira Reichman.

THE DETAILS SET ONE FACE APART

PORTRAITURE ENHANCES SENIOR HUMANITIES

by Linus Rollman and Anne Moloney

Our Design classes happen once a week and last for an hour and a half. Your schedule may, of course, be different, but for the purposes of this lesson string we will assume that your classes are of a similar length—these lessons can be broken up as need be.

Arbor's curriculum for sixth, seventh, and eighth grades offers a three-year integrated Humanities and Design program. The content for the design work comes from the humanities and exposes students to a variety of techniques over the three years. By the time a student finishes eighth grade he or she will have worked in clay, glass, wood, collage, metal, fiber arts, painting, and drawing. Special emphasis is placed on drawing with the idea that it is a building block for confidence and success in many art forms.

Each year at Arbor is designed around a broad theme that animates our work, not only in Humanities and Design, but in Science as well. Our current year, the theme of which is "Pattern and Diversity" at the Senior level, begins with a study of South Asia—major Design projects focus on rangoli and mandala patterns (plus music, storytelling, paintings of Hindu gods and goddesses, and a celebration of Diwali)—and then moves to the diversity of African people. In their Humanities work, students study individual African countries, read Peter Dickinson's novel *AK*, begin to examine the history and legacy of colonialism in Africa, pore over statistics, and look for patterns.

Africa, of course, is immense, both in terms of area and in terms of the richness of its history and cultures. A unit that aims to provide students with an initial understanding of Africa as a whole—especially given the often fraught portrayal of the continent in the media and in popular imagination—risks crossing the line from generalization to stereotyping. Portraiture, by its very nature, entails close observation of another human being, and it is our hope that such observation helps foster both a sense of kinship and an appreciation for the incredible diversity of Africa's peoples. As a 2007 Arbor graduate, Rebecca Garner, reflected, "By drawing or painting a face, you learn all the lines, shapes, and shadows of it. You notice small wrinkles or indentations that you might never have bothered to take a closer look at if you hadn't been recreating that face on a piece of paper. You pick out the exact colors and hues of the skin, hair, and eyes. Every little detail contributes to the overall appearance of a certain face. These details set one face apart from the many others out there in the world."

Throughout our studies of Africa, the students create three or more finished portraits using a variety of media including pencil, charcoal, oil pastel, and watercolor. Some of our students begin this unit intimidated by portraiture and balking at the very idea. As the unit progresses they all relax, grow in confidence, and are often surprised by and proud of the results they achieve.

Day 1: Principles of portraiture; black and white portraiture

Begin by distributing the Principles of Portraiture handouts. Ask the students to spend a few moments studying the illustrations and ask what they notice. Take time to go over the principles.

Ask the students to choose an image for their first sketch—they will be doing quite a few quick sketches, so they needn't choose their favorite images to start with; any image will do. For the first sketch, set a timer for no more than two to three minutes and tell your students that their job is to capture only the underlying structure of the subject's face. Their drawings may be no more detailed than the face at right.

The important thing is that students should follow the rules of proportion they have just learned. There are a number of purposes to such a short drawing exercise. First, it emphasizes process over product—it is only practice, so there is no need to become too invested in the outcome.

This is an attitude that is worth fostering throughout this lesson string. One of the things that can make design a challenging realm for some students is that they become too wedded to the individual pieces and fail to understand that, in some ways, they are all practice. The less erasing and redrawing they do, the better.

Second, quick sketches allow students to practice the principles of proportion. Third, the exercise allows students to relax, get comfortable, and settle into drawing. Do at least three sketches that last no more than two or three minutes apiece. Have the kids switch images between every sketch.

Once the students have made several quick sketches, you can ask them to work slightly longer on another—but no more than about five minutes. This time they can begin to put in some details once they have drawn the underlying structure of the face.

Now move on to charcoal. This time, you don't necessarily need to set a specific time limit, but do stress that this is still "practice." The kids should spend a few minutes making an underlying pencil drawing just as they have done in the previous exercises and then apply the charcoal. Their job with the charcoal is to shade the darkest portions

When your students are working with any color medium, encourage them to use scrap paper to test the colors, and particularly blends of colors, before they use those colors in their portraits.

Day 1 Supplies:
8.5" x 11" paper, pencils; black paper (can be black construction paper or "art" paper intended for chalk), chalk (ordinary blackboard or "art" chalk, which is slightly denser); gray paper, charcoal; photocopied portraits for students to work from. We recommend Carol Beckwith and Angela Fisher's beautiful book *Faces of Africa*.

Download the **Principles of Portraiture** handout at http://www.arborschool.org/pdfs/PrinciplesofPortraiture.pdf. Please photocopy as many as you need.

We cannot stress enough the importance of experimenting with new techniques and media yourself before you try to teach them. You definitely do not need to be an expert—in fact, students are often encouraged by watching their teachers move through the learning process along with them—but nothing will prepare you better than a little experimentation to help your students with the difficulties and frustrations that they will experience.

of the portrait. Encourage them to find two or three different shades of charcoal by varying the pressure and then to search for those shades in their portrait.

The next exercise is essentially the reverse of the last: white chalk is used on black paper to capture the highlights of the image rather than the shadows. Once again, have the kids make pencil drawings to start and then have them move to chalk.

Examples of charcoal shading in progress, a "finished" chalk image on black paper, and a finished charcoal and chalk portrait on gray paper. The two images at right show how smudging can be effective for shading chalk and charcoal.

One of the hardest things about drawing faces is that we are so used to looking at them and so used to iconic representations of them. We come to recognize an image like this, for example:

as an eye, while in actual fact no human eye looks like this. Continually ask your students (and yourself!) to really look at the images in front of them. Do they really see a "nose" like the classic cartoon of a nose or do they see an area of shadow and another of light that define the nose?

The final exercise of the day, on which you should encourage the kids to spend the longest time, combines the previous two techniques. Charcoal and white chalk are used on gray paper to capture shadows and highlights. As before, there should be an initial pencil drawing. Students should choose either a new image or their favorite image that they have worked with so far.

To wrap up the class, consider having the kids show their favorite drawings to their classmates and talk about what techniques were most useful and satisfying to them.

One of the most important things to stress, no matter what medium the students are working in, is the size of the head. Many students like to work small—discourage this as much as you can! If the subject's head occupies the entire page, the end results are likely to be far more satisfying. We have told many a student to begin again because he or she has started with a tiny portrait.

Day 2: Oil pastels

This work builds directly on the work from the first day. The same principles continue to apply: make a pencil sketch first; pay attention to the rules of proportion; work big; observe carefully. Consider beginning with a few warm-up sketches, depending on how comfortable your students are with portraiture at this point. Then demonstrate to them how you used oil pastels when you were experimenting.

Day 2 Supplies:
sets of oil pastels (caution: oil pastels of different brands do not mix well!); paper (quality paper will help this work a great deal; we use 100 lb. Bristol smooth paper rather than more expensive options); color copies of photos for the students to work from (color copies can be expensive; we learned the hard way to protect them with plastic sleeves)

There are a few things you ought to know about oil pastels before you experiment and before you give your students advice. Oil pastels blend very readily and layer on thickly, meaning that the pencil sketches will disappear underneath the pastels and that there is plenty of room to change a portrait once it is underway. Even though your students' portraits may not immediately look the way that they want them to, encourage them to keep working and blending colors. Any color can be either darkened or lightened by mixing in another color. Oil pastels reward bold color choices. Suggest to your students that they work with vibrant colors, choosing purples or blues or greens for shaded areas rather than black. It is hard to capture minute details in oil pastels. Encourage your students to look for broad patches of color, shadow, and light rather than trying to work with the pastels as if they were fine-tipped pencils. Blending in white at the end creates strong highlights. When students do finish, they may choose to color the backgrounds if they like. We suggest mounting your oil pastel drawings on black construction paper.

It took most of our students longer than a single hour-and-a-half class period to finish their oil pastel portraits. Be patient.

Day 3: Watercolors

Because students work at different paces, we suggest beginning with a demonstration of watercolors regardless of whether all of the oil pastel portraits have been finished. Students can then move on to watercolors at their own pace. You might want to encourage students to choose new images for their watercolor portraits, although there is also something to be said for reworking the same image in a new medium.

Again, all of the principles from the previous lessons continue to apply. Working in watercolor, however, is entirely different from working in oil pastel. The lines of the original pencil drawing will show through, to some extent, in the final piece, so it is especially important to work lightly in pencil. Although you can blend watercolors when they are wet, you cannot move from dark to light on the page. Advise students to start with extremely light washes of color and move gradually to darker colors. It is possible, if too dark a color is applied, to blot it from the page with a dry paper towel as long as the paint is still wet. If you paint into wet watercolors, your colors will bleed. Encourage students to allow their colors to dry before they apply new ones.

When a portrait has completely dried, color pencil can be used to add detail that it is hard to capture using watercolors alone. Students can choose whether or not they wish to use this technique. As with oil pastels, they can also choose whether to apply background colors.

Patrick Flynn works on a watercolor portrait

Day 3 Supplies:
sets of watercolors; trays to mix colors; brushes; paper (although you can test your colors on ordinary typing paper, watercolor paper works much better for the actual portraits); color copies of photos

Day 4: Finishing and beyond

At this point, most students are likely to have either an oil pastel or a watercolor portrait in progress. Allow them time to finish. When they've done so, they can return to the chalk portraits from the first day.

Depending on time constraints, on your plans, and on the interests of your students, you might consider moving on to other media as well. Media to consider might be dry pastel, acrylic paint, collage, or graphite. Some of our Seniors seek out faces from the African countries they research independently for Humanities, enhancing their understanding of the individuals who live there. Lynne Stracovsky, who graduated from Arbor in 2007, was inspired to begin a series of portraits she calls "Faces of Asia," which she has continued ever since.

To some, portraiture may seem a curious choice for a design focus during a unit on Africa, since it is not among the "traditional" arts generally associated with that continent. Indeed, we have chosen it in part to break away from ordinary ideas of what is African. But believing that close observation fosters empathy and appreciation, we try not to neglect the other arts of Africa, which most students find quite absorbing. We organize two weeks of afternoon workshops to teach such crafts as making toys from found objects, making masks, and painting traditional kente-cloth patterns. We also bring in outside experts to teach African dancing and drumming in preparation for a culminating performance for the Arbor community.

A study of portraiture can enhance any humanities unit, whether you are studying Africa or the Great Depression in the United States. A collection of strong and evocative photographs to work from and a willingness to experiment with rendering techniques are the only prerequisites.

Full-color examples of oil pastel and watercolor portraits by our students and larger copies of the images in this article are available at http://www.arborschool.org/pdfs/AfricanPortraits.pdf

Portraits by Gabriela Key, Louise Reynoldson, and Grace Hashiguchi

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Cambium

INNOVATIVE CURRICULUM FROM THE ARBOR SCHOOL OF ARTS & SCIENCES

THE INTELLECT, CHARACTER, AND CREATIVITY INSTITUTE 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 to improve it? Please send us an email.

Masthead by Jake Grant, after an 1890 botanical illustration. Plant block print by Annika Lovestrand.

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Lilah and Ella as Greek goddesses

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