



ASSOCIATION OF CHILDREN'S MUSEUMS



Snake lovers in Opal School of the Portland Children's Museum research questions like, "What does a snake look like on the inside, and how do these bones help it move?"

Young children are fearless science learners. With little encouragement they observe, explore, classify, predict and experiment. In the process, they develop theories and build formative scientific concepts about size, motion, liquids, gravity and space. Young children not only engage easily in science learning, but the early science learning they engage in is, in fact, very much like good science learning for much older children.

Science at Play

Museum Preschools Offer Rich Environments for Science Learning

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Museum preschools follow, borrow and are inspired by current and popular early childhood education philosophies, principles and practices, including inquiry, family learning, Montessori and the Reggio Emilia approach. As in preschool programs of all kinds, certified and experienced teachers and assistants plan activities and projects around themes and topics that children explore in small group time, story time, dramatic play and free play. Reflecting established early childhood practices, they use a hands-on approach that is play-based and developmentally engaging and challenging. Successfully meeting local and state licensure, many museum preschools carry the added distinction of being accredited by the National Association for the Education of Young Children.

Young children attending museum preschools, however, spend their days in an extraordinarily rich and remarkable learning environment: the museum. They enjoy easy access to hands-on exhibits, immersive environments, dioramas, collections, program carts, gardens, naturoscapes and sometimes even an inquiry room or a planetarium where their natural propensity for learning takes off.

Young Learners are Science Learners

Young children are fascinated by their

world. They notice things. They notice what is puzzling, interesting and ever-so slightly different from what they noticed yesterday. They are eager to explore and will use their senses to find out what something is made from and what it will do when banged, squeezed, dunked or dropped. Children test their ideas by repeating an activity to deconstruct and reconstruct their understandings. They ask questions and when a question is answered, they follow with another question and another. With small steps, they build on previous knowledge by watching adults, watching vehicles, digging in sandboxes, picking up earthworms or splashing in a pool.

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Science learning happens for young children everywhere and in everything: shaping clay, blowing bubbles, watching ants, collecting stones or printing with fish. Rich science learning is happening through play as they muck about, challenge themselves,

How often does anyone pass a museum or a science center and say, "There's one of our best local preschools." A preschool in a museum? Eager young learners following their unfettered curiosity about their world right through the museum doors?

At more than a dozen museums and science centers across the United States, young children attend half-day or full-day preschools. (Even more do in European and Asian museums.) Over the last sixty years, museums and science centers have added preschools as part of their missions to grow science learners, to stimulate science interest or to study and explore play and the learning that happens through play.

Museum preschools have much in common with their non-museum counterparts. They serve as a preschool option and accommodate family childcare needs. They enroll children two to five years old and sometimes children six weeks through eight years old. Some classes are age-based and others are mixed age. Some follow a preschool tradition of part-day sessions and part-week schedules. Others are full day, full week, year round.

make mistakes and express ideas through language, gestures, images and materials. Play is intrinsically rewarding so when children learn science concepts through play, science acquires the incalculable benefit of being pleasurable and rewarding.

While children may have an affinity for science, every activity and project even in a science center's preschool does not focus on science. In the naturally interdisciplinary world of young children's exploration, many interests and questions are likely to intersect with areas of science. For instance, projects at the arts-based preschool at The Family Museum in Bettendorf, Iowa, may start with dance, move to music and then explore rhythm and sound in the exhibit hall. But children's natural dispositions to notice, ask questions and test ideas are assets for learning science or any other subject.

Guiding Young Science Learners

Children's capabilities and strengths are apparent in settings planned with their interests at the center where they can use what they know to build more complex knowledge. Children have definite ideas of what they are interested in: what is big and what is novel; what sparkles and what moves. One child may be interested in dinosaurs, another in trains and another in shiny rocks or worms. Sensory play, imagination, a story, drawing or a teacher-led discussion interact with the experience bank of a preschooler and lead to new possibilities for them to test.

The role of the teacher is critical in nurturing young science learners. With their knowledge of child development and experience in preschool settings, teachers know how to adapt activities to age groups and how to coach museum experts on what to expect from young children. Moment-by-moment, teachers find ways to extend children's exploration: a friendly question, a just-in-time tool, an unhurried moment for a cautious child to hold a snake, or recording a reflection on a child's wondering.

Teachers work with one another to develop preliminary plans, share observations of children and in museum preschools use their creativity to connect exhibits to children's interests. In partnership with parents, teachers' complementary perspectives and shared understandings make it easier for parents to scaffold activities and support their child's learning at home.

With skilled facilitation and their own curiosity, teachers extend children's first-hand exploration of real stuff, intriguing



Museum Preschools

Science Center of Iowa's SCI Preschool students work with their teacher to build an arch in the experience platform When Things Get Moving.

- The Children's Museum Preschool
The Children's Museum of Indianapolis (IN)
- The Children's Museum Preschool
The Children's Museum (West Hartford, CT)
- Discovery Kids Preschool
Discovery Center of the Southern Tier (Binghamton, NY)
- Early Childhood Institute
Miami Children's Museum (FL)
- Early Explorations Preschool
Great Explorations (St. Petersburg, FL)
- Eureka! Nursery
Eureka! National Children's Museum (Halifax, UK)
- Hands On Preschool
Hands On Children's Museum (Olympia, WA)
- Museum School
Fort Worth Museum of Nature and History (TX)
- Opal School
Portland Children's Museum (OR)
- Preschool Alternative
The Family Museum (Bettendorf, IA)
- The Preschool
A.C. Gilbert Discovery Village (Salem, OR)
- RMSC Preschool
Rochester Museum and Science Center (NY)
- SCI Preschool
Science Center of Iowa (Des Moines, IA)
- Smithsonian Early Enrichment Center
(Washington, DC)
- Woodbury Preschool
National Museum of Play (Rochester, NY)

objects or live animals. Museum preschools cultivate these young but large appetites for learning. With changing exhibits that can include skeletons, soundscapes, birds and butterflies, dioramas or platforms for material exploration, museums place an amazing world at children's fingertips. In preschool-sized portions, young children can explore big exhibits where they might meet a nine-foot polar bear, get to know ants, or sit in a dinosaur's footprint. In classrooms and behind the scenes, they may meet museum scientists, docents and exhibit builders, who, along with their teachers, guide their discoveries of the world.

Museums as Starting Points for Science Learning

Daily investigations of artifacts and specimens from the teaching collection at the Museum School at the Fort Worth Museum of Science and History inspire children's science learning. Building on their fascination with dinosaurs, a class of four-year-olds investigates leaf fossils, an ammonite, a fish fossil, a dinosaur egg model and Sauropod bone fragments. Amazement at the size of dinosaurs moves the group from its classroom base to the Dino Dig hall and the life-size models outside the museum. A concrete understanding of size begins to take shape as children count the steps from tip to tail of the Paluxysaurus; sit in the huge footprint of a plant-eating dinosaur; and compare the femurs of a dog, dinosaur, bison and zebra.

Exploration of a topic may begin with an exhibit visit and return to the classroom. Children enrolled in The Children's Museum of Indianapolis Preschool visit an exhibit daily. Approaching Martimus, the museum's nine-foot stuffed polar bear, discussion starts on the day's focus: observations of polar bear adaptations. Rubbing a fur fragment, children observe that although the bear's fur looks white it really isn't. Their observations about the fur and the observational drawings they make of Martimus form the foundation of discussions back in the classroom about how the fur is hollow (clear) and aids in insulating the animal. A scientist/curator brings in artifacts, such as different types of indigenous fur and whalebone (baleen), for a short presentation about how these items assist adaptation.

Preparing for children's interests starts long before they enter any classroom or exhibit gallery. Teachers at Woodbury Preschool at the National Museum of Play in Rochester, New York, formulate project ideas early in the school year using observations about children's interests from past years. Class visits to the *Dancing Wings Butterfly Garden* invite children to pursue interests, as do teachers' questions, such as, What do you think is alive here? How do these insects do what they do? Children use assorted tools—books, photos, magnifying glasses and binoculars—to observe and express what they wonder about. Patterns of questions and play themes guide teachers in extending children's exploration. Three-year-olds photograph eggs about to hatch and later pretend to hatch from "eggs" themselves using dramatic play props. They create habitats with natural materials. A visit

from the museum's entomologist helps answer questions about insect behavior such as, how do butterflies eat? Projects evolving from children's expressions of interest may extend over several weeks.

A classroom-window view of a condominium undergoing renovation sparked questions that initiated an investigation of buildings for the three-to-five-year-old class at SCI Preschool at the Science Center of Iowa. Curiosity led to viewing the time-lapse footage of the Science Center's construction. Moving from an outside view of the center to an inside view, they toured the building. When the center's maintenance director visited with the building's blueprints, children wanted to know where, on the drawings, their classroom was. As children built with blocks in the classroom, they discovered even more questions, such as, "Can buildings be round?" which they further explored.

Observations, senses and the imagination work together when children from the Rochester Museum and Science Center's RMSC Preschool visit the museum's Iroquois Longhouse diorama. At their initial visit, children look closely into the diorama of inside the longhouse where family members gather around a fire. Their questions focus on the familiar—the dogs—and the unfamiliar—a small group of Iroquois girls clustered together. "What are they doing? Why are they sitting near the 'little house' (an oven)? What are they baking in the oven? What are the pots for?" At a subsequent visit to the diorama, the children draw on both memory and senses; they close their eyes and talk about sounds they might hear and smells they might sniff in the longhouse. Smells of wood burning and food cooking lead to comparisons with their own families.

Discussion about making clay pots continues back in the classroom where the children examine a clay pot that they then draw. On a future visit, children may begin to build a story about the family in the longhouse.

Adults paying attention to children's questions encourage children themselves to pay attention to their own wondering. A week after children in the Early K class at the Portland Children's Museum's Opal School in Oregon observed a molted snakeskin, their teacher brought in a snake skeleton. Children observed the inside of a snake. Using their "owl eyes" they looked closely at the bones and noticed the lines that make up this reptile. They lightly touched the skeleton. They documented what they noticed with observational drawings using a black pen. Observational drawing invites them to slow down and use their senses to explore the object more resulting in comments like: "It looks like mountains when he curves." "He has a bump." "He gets bigger, then he gets smaller." "This side of the snake is different than this side. It's smaller."

Young children develop theories. They speculate based on what they notice and what they remember from previous experiences. Observations of the snake skeleton suggest several theories about the function of the bones: "Maybe those things help him move." "I think those held on to his scales." Theories about what ants eat proposed by children in the Old Blues Class, one of several preschool classes at The Family Museum's Preschool Alternative, are very much informed by the experiences of this class's four-year-olds and what they like to eat. Ants would want to eat gold fish crackers, gummi fruits, cheese sticks and cookies. The group tests its theory, filling petri dishes

with likely ant food favorites, and placing them where ants crawl around (in the dirt). They check the dishes daily, count the ants in each dish, and record the number of ants on a chart. After two weeks, the Old Blues conclude that ants like sweet foods; and, they observe, they do, too.

An Early Start to Science Learning

Young children are eager for meaningful discoveries and are active and delighted in pursuing them. Time to engage in the complex process of learning guided by a teacher's skilled facilitation encourages children to pay attention, build on old discoveries, find new connections, form new questions and follow their learning over days and weeks and years. This process unfolds daily in preschools all over the world.

The potential of object-filled museums, with exhibits and collections to enrich daily activities and weekly preschool projects certainly distinguishes a museum preschool from other preschools. While use of these resources can and does vary, museum preschools also operate within an informal learning context and approach that guides the rest of the museum's activities. The high value museums place on learning experientially with objects aligns firmly with the active, hands-on investigations of a young child's science learning. 

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