EXPLORING THE WILD WORLD OF WIGGLY WORMS!

YOUNG STUDENTS GET THEIR HANDS DIRTY WHILE INVESTIGATING EARTHWORM HABITATS AND BEHAVIORS.

By Lynn Dominguez, James McDonald, Katie Kalajian, and Kristine Stafford
Young children are naturally curious and constantly exploring the world around them. Combining this curiosity with the outdoors and nature for science skill development has many advantages for young learners. These include: building self-confidence, developing basic science concepts, increasing observational skills, providing the opportunity to use tools, opportunities to problem solve, stimulating curiosity, and developing sensory, physical, emotional, intellectual, and social skills (Taylor 2003). In addition, through hands-on experiences outdoors young children can develop a greater appreciation and understanding of the natural world.

As children develop an enhanced understanding of the natural world, they are also developing explanations of how things work. According to Wilson (1995), “Experiences in the out-of-doors tend to be rich in opportunities for nurturing growth in all of the developmental domains, including adaptive, aesthetic, cognitive, communication, sensorimotor, and socio-emotional” (p. 4). This article outlines a lesson where children observe the behavior of worms—indoors and outdoors—learn the parts of a worm, and apply that knowledge to increase their knowledge about worms and the habitats in which they live.

Allowing children to explore is consistent with the Next Generation Science Standards (NGSS). Beginning in kindergarten, children observe plants and animals and learn what they need to survive. Performance Expectation K-LS1-1 states “Students who demonstrate understanding can: Use observations to describe patterns of what plants and animals (including humans) need to survive” (NGSS Lead States 2013, p. 6). By doing this, kindergarten students are also engaging in the science and engineering practice of Analyzing and Interpreting Data. NGSS states that the science practice for this performance expectation is “Use observations (firsthand or from media) to describe patterns in the natural world in order to answer scientific questions” (p. 6). This also allows the children to explore the disciplinary core idea LS1.C: Organization for Matter Flow and Energy in Organisms: “All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow” (p. 6). There is also a connection to the Nature of Science portion of the NGSS (Scientific Knowledge Is Based on Empirical Evidence) that states “Scientists look for patterns and order when making observations about the world,” which relates to performance expectation K-LS1-1 (p. 6). Encourage your students to look for patterns in their observations. This can be a part of the Engage portion of the 5E that we describe later. All of the connections to the NGSS allow children to know what to look for as they are watching the worms and that what they are learning has a connection with the larger world.

### The Outdoor Learning Environment

Learning about the worms living in their local area allows children to experience a world that is hidden from view. Worms can usually be found in the school yard or at local parks within walking distance. These relatively accessible and safe outdoor places give children numerous chances to practice appropriate outdoor behaviors. Easy outdoor trips allow children to become familiar with science tasks such as mapping, sampling, observing, and identifying, while still allowing time for exploration and discovery (Maynard and Waters 2007).

Taking children outside to explore worm habitats provides an enriching and dynamic learning experience (Gladwin 2005). If you are already using your school yard for learning activities or even have an outdoor education area available, then the preparation for worm activities is simple—walking through the area beforehand, doing some preliminary “digs,” and planning your activity areas. For teachers that haven’t used the outdoors very often, we include the following suggestions to help your students make the transition from inside the classroom to outdoor explorations.

- To ensure an enriching and safe experience, we always take a walk around the buildings and school yard looking for areas that have damp, rich soil. If your site already has a garden, then this will be an excellent place to search for worms. We use a trowel or large spoon to carefully dig for worms. If the weather has been very dry, you may have to water an area for a few days to ensure that worms are near the surface.

- We plan out the path our children will be using to avoid traffic areas and determine the boundaries of the area that students will explore. With young children it is very important that they understand and can see boundaries.

- Before leaving the classroom, we always lead a discussion about appropriate behaviors for the outdoors. Walking and talking quietly gives our students a better chance of seeing wildlife. The more frequently we take our children outdoors for learning, the more ready they seem to be to accomplish the learning tasks set for them.

- Some tools we find useful for our student’s outdoor explorations include: trays or tubs for dirt and specimens, spoons/trowels for digging, hand magnifying glasses, cardboard clipboards with pencils or crayons attached, and pictures of worms. Recycled items from home such as margarine tubs, cereal boxes (for cardboard clipboards), cast-off spoons, and old Rubbermaid containers work well for the outdoor classroom.
• When we are ready to go outside, we explain to our students what they will be doing, the tasks they need to complete, and to always look first—don’t touch any wildlife they may find. We caution students that they must always be able to see their hands—don’t reach into or under bushes! We check for poison ivy and remind the students of the saying “Leaves of three, let it be!”

The following activities have been adapted from Growing Up WILD: Exploring Nature With Young Children (Council for Environmental Education 2010), an environmental education activity guide for children ages three to seven (see Internet Resource). We have used the 5E instructional model (Bybee 2009) to organize the activities. This instructional model provides a framework that builds on students’ prior knowledge and allows them to actively engage in doing science through investigations.

### Literary Resources

#### Nonfiction

- **An Earthworm’s Life** by John Himmelman
  Underneath the soil, below the child’s bare foot, and among the roots and pebbles we can examine the beginning network of a worm’s tunnel. Each page provides a detailed look into the worm’s world while the text describes the page’s content with a sentence. The illustrations provide a useful perspective.


- **Wiggling Worms at Work** by Wendy Pfeffer and Steve Jenkins
  Deep underground and on the surface, worms are hard at work! Worms work like little plows, burrowing through soil by swallowing it. As they make their way through the dirt, worms loosen the soil so roots can spread and grow. Worms eat the bits of leaves and plants mixed with the dirt and leave behind castings that feed the plants. Find out how worms help us as they wiggle their way underground.


- **Wonderful Worms** by Linda Glaser
  Simple informational text and full-color illustrations encourage an appreciation for the small creatures of the Earth by explaining the vital role that earthworms play in the planet’s ecosystem. This book includes cross-section illustrations of the worm’s underground environment and informative charts.


#### Fiction

- **Diary of a Worm** by Doreen Cronin
  This is the diary of a worm. This worm lives with his parents, plays with his friends, and even goes to school. But unlike you or me, he never has to take a bath, he gets to eat his homework, and because he doesn’t have legs, he just can’t do the hokey pokey—no matter how hard he tries.


- **Herman and Marguerite: An Earth Story** by Jay O’Callahan
  Award-winning storyteller O’Callahan offers another of his most popular tales, a story of helping each other and sharing our gifts. Herman, a shy earthworm, spends most of his time in the dark, crumbly earth, eating dead leaves and making tunnels. Marguerite, a lonely caterpillar, lives in the orchard above Herman’s underground world, where Herman munches on plants, sings her songs, and waits for the time when she will become a butterfly.


- **The Racing Worm Brothers** by Gary Barwin
  One day, Aaron and Ryan decide to adopt a pair of worms. They have a wonderful afternoon playing with their worms, Pinky and Worm, but soon realize that what these little guys really want to do is race. The boys do everything they can to help—encouraging them, nurturing them, and making maps and sleep-stations to plant en route. Somehow things don’t seem to move along terribly fast, and the boys actually lose track of their small squirmly buddies!

Let’s Learn About Worms

Engage

To get started with our worm explorations, we gather the children together and lead a discussion about animals they think might live in the soil. A KWL chart works well to list what the children know about worms. After the discussion we read a book about worms (see the “Literary Resources” sidebar). We then show pictures of different types of worms and discuss where they can be found. Any questions the children have about worms are listed on the “WANT to Know” column of the KWL Chart.

We let the children know that they will be looking at real worms to find out some answers to their questions. Before beginning, students should be reminded and shown how to handle the worms with care while investigating them. Remind students that they must wash their hands after handling any animal or other living creature. Damp paper towels are placed on a table with a worm in the center of each. The children observe the worms and ask more questions about them. We help guide their observations with questions such as: What is your worm doing? What color is your worm? Can you point to the “head” of the worm, the “tail”? What does your worm feel like? How does your worm move? Students will usually mention that the worms don’t have legs, that they “wiggle” like a snake, feel “cold,” and are the color of dirt. These discussions give us the opportunity to correct any misconceptions that students might have about worms and also prepare them to continue their observations outdoors. When we are done with the worms, they are carefully returned to their container of soil so they can be placed back outside in the garden. We then ask the children what they learned about the worms and list their responses on the KWL Chart.

Explore

We continue our examination and observation of worms by going outside to find the homes—habitats—in which worms live. Students are once again reminded to handle the worms with care and that they must wash their hands after handling the worms. Students are guided to areas of loose, damp soil and use large spoons or trowels to carefully dig for the worms. Containers are ready to scoop up soil and place the worms inside for easier observation. As the children dig and look for worms, they have lots of questions and make many observations. Some of the questions may include: Why do the worms live in the ground? What do the worms eat? How can worms see in the dirt? Don’t the worms get dirty? Since much of the discussion usually concerns dirt and begins with observations—“dirt is wet,” “dirt is yucky,” “I don’t like dirt on my hands,” and so on—we talk with them about what dirt is and why it is important. They usually have ideas and questions about how worms interact with soil. This gives us the opportunity to discuss what worms eat and the effect they have on soil. Children often mention that worms are “eating dirt.” Although worms take in some dirt with their food, they really eat plant material or decaying animal matter. Small sand grains help worms to grind up their food. We have the children return any worms they find to their outdoor homes and watch the worms as they burrow quickly underground. This is a good time to point out that worms burrow with their “head” end first, so even though both ends of the worm look alike, they really are different. This activity was adapted from “Take Me Outside,” from Growing Up WILD (Council for Environmental Education 2010, p. 20).

Back in the classroom, we redirect the children’s attention to the KWL Chart and ask them to add anything else they learned about worms while outside. Then we tell them they will be constructing their own giant size worm for the classroom! The children stuff paper bags full of crumpled newspaper to make “worm segments.” The segments are taped together to form a long worm that will take all of the children working together to wiggle it around the classroom. We discuss the parts of the worm and have labels (mouth, head, worm, and tail) ready for the children to stick on the worm. This helps the children recall their earlier observations and helps frame their explanations.
Explain

It is important to hear the children’s explanations of what is going on, as this will have an important role in developing conceptual understanding (Vasquez 2008). A new column is added to the KWL chart to make it a KLEW chart (Hershberger, Zembas-Saul, and Starr 2006). The “E” stands for “What evidence supports new wonderings we can investigate?” These occur as a result of students’ investigative activities. For students to record a statement under the “L” column, they must be able to provide “specific data that supports the statement” (Hershberger, Zembas-Saul, and Starr 2006, p. 51). The KLEW chart makes evidence essential to learning. We gather the children together and ask them what they observed outside about the worms. Examples of their responses include: “The worms were deep in the ground;” “they live in the ground and dirt;” “I thought worms were wet and slippery, but they aren’t;” “they wiggled through my fingers;” and “worms have two pointy ends.” We talk about what their observations mean and what we have learned about worms. These are added to the KLEW chart.

Elaborate

To begin the next activity, we review what the children have listed on the KLEW chart about worms. We explain they will be using pretend worms to learn more about worm bodies. Each child is given a multicolored gummy worm. They measure the worm, color a picture of the worm parts, and describe what each color of the worm tastes like (activity from “Mighty Math: Gummy Worm Dissection” in Growing Up WILD, Council for Environmental Education 2010, p. 21 and 72). Make sure the students wash their hands before tasting the gummy worms and check with parents before the activity for any allergies. If the children haven’t already done so, we point out the differences between real and candy worms, such as real worms have mouths, we don’t usually eat worms, worms can move by themselves, and real worms are alive—candy worms are not alive. Following the gummy worm activity, we get active and put on some dancing music. The children move like they think worms would as they crawl through the soil. Worm painting finishes up this section. Each child is given a paper plate, a puddle of paint, and a plastic fishing worm. The children wiggle their plastic worms through the paint, leaving a worm trail behind (from “Art Projects: Worm Trail Paintings” in Growing Up WILD, Council for Environmental Education 2010, p. 21).

Evaluate

The worm activities our children participate in provide a number of artifacts used to evaluate growth and learning about worms.

- KLEW chart: We examine the class KLEW chart for growth over the span of the lesson. We look for how children have used their observations to demonstrate conceptual understanding by using evidence to create their own explanations of how the worms behaved.
- Dissection sheet: Use of the dissection sheet allows students to demonstrate their practical understanding of the parts of a worm, use of measurement, and making inferences between the gummy worms and real worms. We collect the dissection sheets and note student understanding of measurements, counting, and the ability to accurately label the worm parts.
- Observations: Formative assessment is used to determine how well the students are observing. We always look for items that tell what the children need in order
to observe something in a more detailed manner. If we feel the students need additional structure, we can intervene by asking questions that will focus their observations. This also relates back to the NGSS science practice of Analyzing and Interpreting Data by using observations to describe patterns (NGSS Lead States 2013, p. 6).

• Teacher Reflection: We use the KLEW chart, dissection experience, and our observations of students to reflect on what the children can do better the next time those skills are used in a lesson. The answers help us structure future learning experiences for our students.

Follow-Up Classroom Activity

If your school allows live animals in the classroom, a terrarium is easy to set up. It can be used for watching the worms as they burrow through the soil and also for lessons on recycling. Small amounts of paper, vegetable scraps, and fruit scraps placed in the terrarium will be dragged under the surface by the worms, eaten, and used to make new soil.

Conclusion

Young children are engaged in the process of “doing” science practically at birth as they explore and learn about the world around them. Classroom teachers have many opportunities to encourage and continue science learning by facilitating a variety of learning experiences. Learning about worms is an easy way for children to practice asking questions, exploring, discovering, and making observations—all important science skills. Taking young children outside is an excellent way to extend the classroom into areas of practical application for science. The outdoors is an exciting place for children to learn in and about; allowing exploration without extensive materials or supplies. A number of excellent early childhood environmental education activities have been developed by both Project WILD and Project Learning Tree. To learn more about these contact your state coordinator for the projects.

Lynn Dominguez (domin1la@cmich.edu) is an associate professor at Central Michigan University in Mt. Pleasant, Michigan. James McDonald is a professor at Central Michigan University in Mt. Pleasant, Michigan. Katie Kalajian is a student at Central Michigan University in Mt. Pleasant, Michigan. Kristine Stafford is a student at Central Michigan University in Mt. Pleasant, Michigan.

References


Council for Environmental Education. 2010. Growing up WILD: Exploring nature with young children. Houston, TX: CEE.


Internet Resource


Connecting to the Standards

Standard K-LS1 From Molecules to Organisms: Structures and Processes

Performance Expectation:
K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.

Science and Engineering Practice:
Analyzing and Interpreting Data

Disciplinary Core Idea:

NGSS Table: K-LS1 From Molecules to Organisms: Structures and Processes

www.nextgenscience.org/kl1-molecules-organisms-structures-processes