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To RUN, STOMP, or STUDY

Hissing Cockroaches in the Classroom



When a young child encounters a strange bug, she may see three choices. Will she run away from it? Stomp and squash it, because it is “icky”? Or study it, learn about it, and then appreciate it?

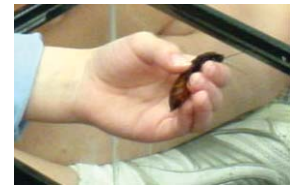
Although children are naturally curious about the living world around them, their science learning is in part influenced by the personal ideas and understandings they construct about the world (Shepardson 2002). Perceptions of certain bugs can hinder extensive learning about the insect world. In one study in which children were asked to describe insects, first-graders commonly used the characteristics of “creepy” and “scary” (Shepardson 2002).

A successful science curriculum for young children includes hands-on learning, interdisciplinary activities, and exploration of the natural world using the scientific method (Zemelman, Daniels, & Hyde 1998). In teaching about the important insect world, teachers should let children observe a wide variety of insects, including tropical ones; explore metamorphosis with live specimens; and investigate insect survival mechanisms such as coloration, exoskeletons, and warning devices (Shepardson 2002).

While these are best practices for a thriving science curriculum, how often do we actually practice them in the classroom? Fully aware that butterflies are usually the only insects studied in early childhood classrooms, I conducted a teacher research project in which Madagascar hissing cockroaches were introduced to a first grade class.

The question

My student teaching in a rural public first grade classroom presented an ideal opportunity to explore the question, Will exposure to hissing cockroaches increase children’s interest in other icky bugs? In other words, could familiarity with these unique cockroaches lead children to study rather than to stomp other bugs they perceive as creepy or scary? I proposed the study to two professors, one of biology and one of early childhood education.



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We gained permission from the principal to adopt two Madagascar hissing cockroaches as classroom pets. The teacher and I then began researching how to care for them (see “Preparing a Hissing Cockroach Habitat”). Once all the necessary accommodations were made, we waited for an appropriate occasion to introduce the roaches. The opportunity arose several days later in the following scenario:

“There’s a spider on the floor!”

“Somebody step on it!”

“YUCK!”

Some of the 18 first-graders gathered around the small spider, waiting for the teacher to retrieve or exterminate the unwelcome visitor. Other children cautiously watched from a safe distance. None of the children ventured toward the spider. The teacher shooed the children back to their desks, scooped up the spider in a paper towel, and took it outside to safety.



How do children feel about bugs?

The following day we conducted individual interviews with the children from the two first grade classrooms. One classroom would get the roaches for pets, and the other would serve as a control group. I used the previous day’s episode with the unwelcome spider as the starting point. Before introducing the roaches, we wanted to gain insight into how young children react to a variety of preserved insect specimens. The children generally responded positively to insects such as butterflies, but recoiled at the thought of garden spiders and ticks.

Many of the negative feelings expressed addressed the physical attributes of the icky bugs: “I don’t like yucky, gross bugs—I don’t like the look of it”; “They look ugly”; “They look nasty—their legs”; “It looks gross—the whole thing”; “I would think that they would hurt me because they look scary—creepy legs.” Some comments stemmed from children’s past interactions with specific insects, what can be called “context-specific understandings” (Shepardson 2002, 628): “Ooh, I don’t like bees—they can sting you real bad and make you cry” or “They [ticks] can suck your blood.”

Prepared with the information gleaned from the interviews as well as from children’s prior knowledge about insects gained from beginning a K-W-L Chart (what we think we **K**now, what we **W**ant to learn, what we **L**earned), we introduced the cockroaches to the first grade class the next day.



They seemed as much intrigued by the insect’s size as they were by the fact that I was actually holding it.

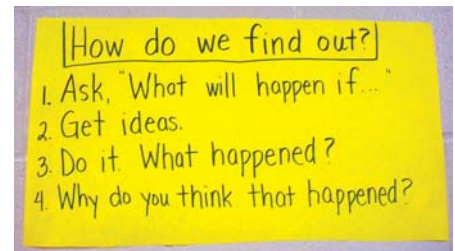
Introducing the cockroaches

The children sat in a circle, squeamishly watching me pick up a cockroach from the container. “We are going to have new pets in our classroom for the next several weeks,” I explained. “They are called Madagascar hissing cockroaches. As I bring a cockroach around for you to see more closely, think of some questions you may have about them.”

As I took the roach around, each child looked quickly, then jumped back with a giggle. They seemed as much intrigued by the insect’s size as they were by the fact that I was actually holding it.

“OK, what questions do you have?” I asked. “One at a time so I can write them down. Maybe we will find the answers to all our questions as we study these new pets.” The questions flew:

- Why do they have shells?
- Why are they brown and black?
- Do they hurt animals?
- What are the big sticky things out of their head?
- What do they do?
- What do they eat?
- Are both the same color?



In the following days as the children observed the behavior of the two roaches, they came up with more questions:

- What are the sticky things on their legs?
- Why do they hide?
- Are they dead? (The children were very concerned about the inactivity of the roaches.)
- Are they smashed? (The roaches wedge themselves into small spaces for protection.)
- How do they hiss? Why do they hiss?
- How can you tell them apart?

Equipped with the children's concerns about icky bugs and the questions they had developed, both of which are necessary starting points for effective science teaching (Project Construct 2002; Shepardson 2002), we now had many directions to go while learning about the classroom creatures.



Preparing a Hissing Cockroach Habitat

The cockroaches we purchased from an educational supply company came complete with a small cage, natural habitat, food, and instructions for care. We found additional information about the roaches and their care online. Here are a few helpful sites:

<http://www.angelfire.com/in/ghcfaq>

<http://www.snuggeybug.com>

<http://www.uky.edu/Agriculture/Entomology/entfacts/misc/ef014.htm>

<http://www.petbugs.com/caresheets/G-portentosa.html>

http://www.lincolnzoo.org/index.php?src=gendocs&link=hissing_cockroach&category=Animals

<http://www.teachersnetwork.org/dcs/critter/cockroach/>

<http://insected.arizona.edu/home.htm>



Since science is best learned by integrating other studies such as reading and writing and drawing, we made sure the books had space for children to draw and write.

Procedures and assessments

Many process skills are necessary for carrying out meaningful investigations. These include posing questions, designing experiments, observing, hypothesizing, predicting, making generalizations about findings, and communicating (Zemelman, Daniels, & Hyde 1998).

During whole-class experiments we used a simplified scientific method:

1. Get ideas. (Pose questions, hypothesize.)
2. What will happen if . . . ? (Design experiment, predict.)
3. Do it. What happened? (Observe, communicate.)
4. Why do you think that happened? (Make generalizations about findings.)

Children's hypotheses and predictions were tested through whole-class experiments. Each child kept a "Hissing Cockroach Science Book" to record both our class experiments and individual observations. Since science is best learned by integrating other studies such as reading and writing (Zemelman, Daniels, & Hyde 1998) and drawing (Stein, McNair, & Butcher 2001), we made sure the books had space for children to draw and write.

The Project Construct checklists guided our observation and assessment of the children, particularly in the scientific thinking and sociomoral developmental domains (see "Project Construct Indicator Checklists" at end of article).

Central to our educational inquiry was whether the children could transfer ideas into different contexts and whether they would be more willing to study bugs rather than stomp them.

Interest grows

The Project Construct Framework (2002) stresses the importance of a classroom's social atmosphere. So we began our experience of the cockroaches on a social level: we named them. After much brainstorming, voting, and debating, the children chose Daisy for the female and Cottontail for the male (soon to be CT for short).

Daisy and CT's cage was the first stop for most of the children each morning. Concern for the insects' inactivity soon grew, so we conducted an experiment using our four-step scientific method:

1. What will happen if CT and Daisy are placed in an empty aquarium with nothing but a toilet paper tube?
2. Will they fight? hide? climb?
3. They went in the tube.
4. It was noisy. They were scared.

Thomas and Jamal designed another experiment, posing the question, "What will happen if we shine a flashlight on them?" We patiently waited for a rainy day when the room would be dark enough to conduct the experiment. When the boys shone the light in the aquarium, both cockroaches moved to a dark corner. Through these two experiments, the children came to understand that the cockroaches are nocturnal and that they hide and remain still for protection.

The children continued their research. We discovered the roaches use their sticky legs to hang onto objects and climb, even upside down. When I dropped a roach by accident, the children pointed out that it was a good thing



the insects had such hard shells. They added the word *exoskeleton* to their vocabularies.

A biology student from the university came to talk with us about how the roaches force air through holes in their sides to make a hissing sound to scare away predators. She also told us how to tell CT and Daisy apart (the male has larger bumps on his head) and explained that cockroaches eat fruit and require a source of protein (like dog food, in our case). The children generated lists of what they learned about our unusual pets.

Since the life cycle of the hissing cockroach is two to three years, we borrowed several juvenile cockroaches from the university so we could compare the size and shape at different points in the life cycle. One morning there was an exciting surprise. Two children noticed that one of the babies was completely white. After many minutes of close observation, they concluded the roach was alive. I suggested that we e-mail our friend, the biology professor, about the mystery. The children continually asked me if we had received an answer. When it came, we learned that the roach had outgrown its shell and molted—another new vocabulary word. Over the next several days, the children recorded observations as the shell of the white roach slowly hardened and darkened.

By re-creating in play what they study in real life, children better learn abstract concepts.

Interdisciplinary, hands-on activities

In what other ways could we increase children's interest in bugs? We found several interdisciplinary activities to foster "thinking, problem solving, and attitudes of curiosity" (Zemelman, Daniels, & Hyde 1998, 115) toward insects.

Main (1984) stresses the importance of interdisciplinary education and of the use of children's natural curiosity about science through language arts and music. After expressing their creativity through music and movement by dancing to the song "La Cucaracha," the first-graders brainstormed a list of story starters to compose their own songs: "One day a cockroach climbed a tree," "One day a cockroach read a hundred-chapter book," "One day a cockroach got famous," and "One day a cockroach went bungee jumping."

And Hailey wrote a story:

One day, a cockroach got a new pool. So he took a swim in his new pool. He jumped in the pool. He said, "It does not have water in it. Silly me. I will put my good water in my new pool." He said, "I will invite my mom for a swim in my new big pool." And he did.

In praising Reggio Emilia's early childhood program, Danoff-Burg points out that "children learn best when they can re-create an idea in multiple modalities" (2002, 44). Using dramatic play in a game of Cockroach Tag, we explored how the Madagascar cockroaches use hissing as protection. Two "predators" chased the remaining "cockroaches," which could be safe only by blowing into a kazoo, much like a hissing cockroach blows air through its spiracles to scare predators.

The children made and recorded keen observations about the structure of the insects' bodies. To better demonstrate how the cockroach mouth works, I gave the children a pair of pliers, two containers, and dry beans so they could transfer food much like a roach does. By re-creating in play what they study in real life, children better learn abstract concepts.

"Building a bug" (Danoff-Burg 2002) offered yet another modality of creative exploration. We gave each child brown



playdough and six black pipe cleaners to create a cockroach model. The children already knew roaches had six legs, but several of them cut the pipe cleaners into more pieces so they could add sticky antennae. Two weeks later, Emily returned her model for share day in an insect carrier that she and her mother had purchased.

We integrated math into our study when we tested our observation skills through a Venn diagram comparing CT and Daisy. We had noticed that the male and female cockroaches had different personalities. On the CT side of the diagram we listed characteristics such as hisses a lot, bigger, horns, more active, and faster; on Daisy's side we included doesn't hiss a lot, smaller, no horns, less active, and slower. In the middle of the diagram were hiss, sticky legs, and same color.

The ultimate sensory experience came on the day the children handled the cockroaches. Their reactions were dramatically different from the first day of our exploration. Now, instead of backing away, they waited impatiently to hold the exotic insects. Holly, who had shied away from the spider, was the first to hold CT. "It feels like I'm holding a caterpillar," she said as CT crawled from one hand to another and then up her arm.

Other children took their turns:

Alicen: Daisy is smelling my hand because she's moving her antennae around. She's figuring out where she is.

Kyle: Her [Daisy] legs feel like suction cups.

Thomas: It feels kinda like snakeskin. It tickles. The cockroaches are awesome!

Grace: This is awesome—weird. I can't feel her antenna and it's on me. She's sniffing around, I think: "What's going on here, people?" I'm starting to get used to Daisy. I love Daisy—she's the calmest.



Final interviews

We conducted the final interviews in the same way as the initial ones but also asked the children about other insects. We wanted to see if the experience with and interest in the cockroaches would transfer to interest in other bugs, such as wasps or water beetles. In both our class and in the control group, the reactions were similar to those in the first interviews: "It's big and looks like it would bite"; "[I don't like it because] the tail is weird—long"; "It's big and scary. I don't like the color. It looks like it could hurt you"; "Because it looks gross—the color." When we asked our first-graders about the hissing cockroaches, every child reacted positively, but the control class had mixed reactions.

Conclusion

Although no differences were found in the reactions of the two classes to unfamiliar icky bugs in the final interviews, the

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Project Construct Indicator Checklists

Cognitive Domain—Scientific Thinking

Increase knowledge of the physical world

- ✓ act on objects to gather information and observe reactions
- ✓ act on objects to produce desired effects
- ✓ explore the natural world

Develop and apply scientific reasoning

- ✓ ask questions or make predictions (based on reasoning) about events in the physical world
- ✓ investigate to answer questions or test predictions
- ✓ draw conclusions
- ✓ apply knowledge to solve personally meaningful problems

Exchange scientific ideas

- ✓ represent ideas orally, in writing or drawing, and/or through the use of materials
- ✓ exchange ideas orally, in writing or drawing, and/or through the use of materials
- ✓ develop a scientific vocabulary
- ✓ justify ideas and solutions

Sociomoral Domain—Personal Development

Be inquisitive

- ✓ pose questions
- ✓ investigate

Be confident

- ✓ express one's own ideas/opinions
- ✓ cope with frustrations/failures
- ✓ pursue challenges

Be inventive

- ✓ transfer ideas into different contexts
- ✓ exhibit a sense of humor
- ✓ engage in the process of creating

Be reflective

- ✓ discuss experiences
- ✓ make connections based on experience or input
- ✓ modify actions based on experience or input

Source: Excerpted, with permission, from "Project Construct Indicator Checklist," *Project Construct: The Early Childhood Framework for Curriculum and Assessment*, 2nd ed., Project Construct National Center (Columbia: Missouri Department of Elementary and Secondary Education, 2002), 57–61, 72–75.

difference in response toward the cockroaches was dramatic. We concluded that teachers need to offer hands-on experience with as many icky bugs as possible, rather than limiting the curriculum to the minimum, such as butterfly development. A rich array of external stimuli that engage children's interest and imagination "positively affect[s] the brain's 'plasticity' (the changeability of brains)" (Wirag 1997, 24).

By encouraging and supporting classroom exploration of insects, with proper health and safety precautions, we can help young children study and appreciate insects rather than stomp and squash them. We think we succeeded.

One day near the end of the school year, Holly was headed outside for recess when she saw a june bug struggling on its back on the floor. "Oh, a june bug," she said calmly, a much different reaction than she had earlier had toward the spider. She promptly picked the bug up, watched as it crawled on her hand, and took it outside to gently set it in the grass.

References

- Danoff-Burg, J.A. 2002. Be a bee and other approaches to introducing young children to entomology. *Young Children* 57 (5): 42–47.
- Main, E.D. 1984. Science and creative writing: A dynamic duo. *Science and Children* 21 (4): 24–26, 99–100.
- Project Construct National Center. 2002. *Project Construct: The early childhood framework for curriculum and assessment*. 2nd ed. Columbia: Missouri Department of Elementary and Secondary Education.
- Shepardson, D.P. 2002. Bugs, butterflies, and spiders: Children's understandings about insects. *International Journal of Science Education* 24 (6): 627–43.
- Stein, M., S. McNair, & J. Butcher. 2001. Drawing on student understanding: Using illustrations to invoke deeper thinking about animals. *Science and Children* 38 (4): 18–22.
- Wirag, D.R. 1997. Share your bench with a bug: Teachers' attitudes toward science and nature influence students' perceptions. *Science and Children* 35 (3): 24–25.
- Zemelman, S., H. Daniels, & A. Hyde. 1998. *Best practice: New standards for teaching and learning in America's schools*. Portsmouth, NH: Heinemann.

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