

Iowa Science Teachers Journal

Volume 39 | Number 1

Article 3

2012

Searching the Web: Observing Spiders to Learn How Different Structures Serve Different Functions

Courtney King

Jensen Elementary, Urbandale, Iowa

Follow this and additional works at: <https://scholarworks.uni.edu/istj>

 Part of the [Science and Mathematics Education Commons](#)

Recommended Citation

King, Courtney (2012) "Searching the Web: Observing Spiders to Learn How Different Structures Serve Different Functions," *Iowa Science Teachers Journal*: Vol. 39 : No. 1 , Article 3.

Available at: <https://scholarworks.uni.edu/istj/vol39/iss1/3>

This Article is brought to you for free and open access by UNI ScholarWorks. It has been accepted for inclusion in Iowa Science Teachers Journal by an authorized editor of UNI ScholarWorks. For more information, please contact scholarworks@uni.edu.



Searching the Web

Photo by Joe Taylor

OBSERVING SPIDERS TO LEARN HOW DIFFERENT STRUCTURES SERVE DIFFERENT FUNCTIONS

Courtney King, Jensen Elementary
Urbandale, Iowa

ABSTRACT: Through exploration and small group discussion, first grade students made connections between physical structures of organisms and their function. Additionally, students explored various spider “homes”. *This activity promotes National Science Education Content Standard C.*

My first grade students love creepy crawlers and they love to investigate them! First it was ants. Next came butterflies. Soon they wanted more! This lesson introduces students to arachnids, or more commonly known as spiders. This three-day lesson makes use of the learning cycle model: exploration, concept development and application.

The goals for this lesson were generated from the National Science Education Standards for content standards for grades K – 4. Through this lesson, students came to understand the characteristics of organisms and the relationship

between organisms and environments. Specifically, the students develop their understanding that “different structures that serve different functions in growth, survival, and reproduction” (National Research Council, 1996, p. 129).

Exploration

The exploration stage created an opportunity for me to observe the students explore a science concept. It also provided the students with a creative opportunity to explore and discover physical features about the topic being discussed.

DAY 1

Before beginning the exploration, I divided the students into groups of four so there would be little movement and fewer distractions during the lesson. This would help eliminate transitional noise and misunderstandings throughout the lesson. For a quick formative assessment, I asked the students to draw a spider on a 1/2 sheet of paper. I then collected the papers and quickly scanned through their work to gain a better understanding of their background knowledge. I utilized these drawings to help me better focus the lesson on appropriate content. I found that students had misconceptions regarding the number of body parts of a spider. Many children drew one circle with legs coming out of the sides of their spider. A spider actually has two body parts; a head and a body. Therefore, I was able to focus my student's attention on the number of body parts on a spider

Material List

- Blank paper
- Coloring materials
- Whiteboard/chalkboard

A small box for each group of students containing:

- 3-5 models of spiders
- Real spider in jar (not required)
- Magnifying glass
- Pictures of spiders

while they observed and explored real spiders, model spiders, and pictures. I was less concerned about discussing the number of legs in detail because the majority of my students understood that aspect of the physical structure of a spider. Additionally, I wanted students to consider how a spider's different structures provide important functions necessary for the spider's survival.

Before handing out any materials for exploration, I told the students they would be looking at different models of spiders as well as one real spider. The materials were located in a science box for each designated group. I explained that the box would contain one real spider in a glass jar and that the students were not to open the jar, but they could use the magnifying glass to look closely at the spider and make observations. I then dismissed one student from each group to pick up the science box at the table in the back of the room. The students knew that they were not to open the box until they were back at their tables sitting down with their group members. This is a management skill that was introduced and practiced at an earlier date.

The students made observations about the different spiders and shared their findings with their partners. While the students were exploring the spiders I walked around and listened to the students' comments and observations. I also asked questions to promote a deeper understanding of the exploration. Some questions I asked were:

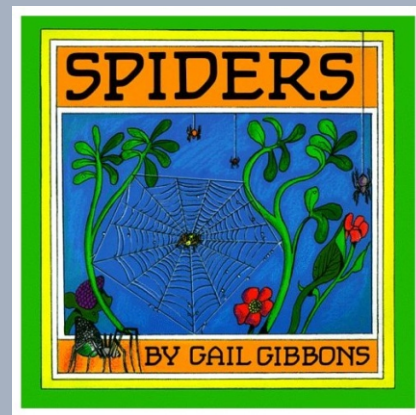
- "What similarities do you notice about the spider compared to the insects from last week?"
- "What differences do you notice between the spider and the insects?"
- "How are you observing the spiders?"
- "Why do you think that is?"
- "Why do you think that?"
- "What is the spider doing?"

These questions prompted my students to move in a desired direction for the discussion later in the lesson. The students were able to very quickly tell me differences between an insect and a spider. They noticed that insects have six legs, while spiders have eight. They were also able to tell me quite quickly that spiders do not have wings like insects do. Only a few students were able to make more detailed observations such as the fangs on the head of the spider.

After students made their observations about spiders, I brought everyone's attention to the whole group. I wanted the students to share out some of their observations to the entire class. As the students shared their observations, I wrote them on the board. I drew a two column table with one column titled spiders and the other titled insects. While I was talking to the individual groups in the spider exploration activity, I asked a few people and groups with important observations to be sure to share their ideas during whole class time. Through this strategy, I was able to make sure the observations I wanted to explore further were discussed through student participation. By informing specific students that I wanted them to share their information, I gave them the opportunity to prepare themselves to talk in front of the class. This is a great way to make the students feel comfortable and ELL (English Language Learner) students have a chance to gather their thoughts before speaking.

Materials Needed for the Concept Development stage

- A board from the exploration activity with 3 columns
- Book: *Spiders* by Gail Gibbons (ISBN: 0823410811)



Concept Development

The concept development stage creates an opportunity to extend student thinking and develop a greater understanding of the content. It is the stage in which students are able to make connections and move into a deeper sense of thinking. After we shared all of our ideas, observations, and comparisons I posed the question,

- “What do you notice about *our* bodies?”

I told the students to share with a partner any observations they had about human body features. After about a minute, I pulled everyone’s attention back to the front of the room. I once again asked the students to share out their observations and they provided me with comments such as “We each have two legs.” I wrote their observations on the board. By now I had three columns labeled insects, spiders and humans with observations in all of the columns. Figure 1 provides my student-generated list.

FIGURE 1
Typical student observations

<u>Insects</u>	<u>Spiders</u>	<u>Humans</u>
6 legs	8 legs	2 legs/2 arms
wings	fangs	stand up straight
3 body parts	2 body parts	2 body parts
antennae	8 eyes	2 eyes
different homes	webs	houses/apartments

I made sure that while I was writing the observations on the board, I was writing them exactly as spoken by the students. I was not changing their comments because I did not want to interpret them differently than what they were thinking.

After all the observations were shared, I asked a few questions to help the students gain a deeper understanding of the similarities and differences among the three columns. Some questions I asked included:

- “What do you notice about the three columns?”
- “Why do you think that spiders, insects and humans have such different physical features?”
- “What do the features allow the three species to do?”

I provided the students a few minutes to think about the questions in their heads and then I asked them to pair-share with a partner. After a minute of partner discussion, I asked the students to share their ideas with the whole class. The students came up with ideas such as “the insects need wings to fly from plant to plant,” “the spiders need a lot of legs to walk on their thin webs,” and “people need arms to do things with such as drive.” They knew that each category had different features that are beneficial for a specific reason.

Due to time, this ended the first day of the lesson. The students had made important observations and reflections that enabled them to make connections between structures and functions. I knew the students would be able to draw from these experiences during our next science lesson. However, to help remind students, I left the observation columns on the board to use in the future lesson.

DAY 2

When we began science on Day 2, I asked the students what they remembered from the prior lesson. I also had a few students review the table on the board. This simple discussion was a reminder and led us into our next topic, which was about spider webs! To transition from the physical structure of the spider to the actual web, I asked

- “People have arms to build houses that they live in. What makes a spider unique in how they make their homes?” and
- “What do spiders do to make their home?”

I could tell that many of the students understood that spiders didn’t use their “hands” to build their webs, but they were still unsure. Therefore, I asked the following sequence of questions:

- “Where do spiders live?”
- “Where does the web come from?”
- “Why do you think that the spiders create their spider webs?”
- “How do you know?”

These questions prompted the students to think about the fact that spiders create their webs with a thin string. At this point I was able to introduce a vocabulary word: *spinnerets*. I wrote this word on the board and explained that spiders use the spinnerets on the backside of their body to create a material called silk, which in turn creates their web. While I want my students to see science as an investigation, this does not mean I will never tell them information. In this case, the students were mentally prepared, through observations and reflection, to make sense of the word spinnerets rather than simply memorize the term.

Next, I wanted to have the students demonstrate their background knowledge on spider webs. I asked all of the students to stand on the reading rug and close their eyes. I prompted them to visualize a spider web in their minds. On the count of three I was going to have them show me what that spider web looked like with their body and then they were to freeze and hold that position. If the students were unsure or had never seen a spider web, then they could guess what a spider ‘house’ would look like. I utilized this teaching moment as a formative assessment opportunity. I counted to three and asked the students to show me their webs. Every student did something different! I asked questions such as

- “As you look around, what do you notice?”
- “What does everyone look like?”

These questions prompted the students to explain that they all looked different, so maybe spider webs look different as well. This was a great transition into the literature I had chosen to introduce web types.

I chose to read the book *Spiders* by Gail Gibbons to the class because it did a great job at introducing the different types of spider webs while providing pictures. I read a few select pages that contained appropriate information and showed the students various pictures of different types of webs. As I read through each page, I had the students respond with their own ideas about the webs. One student said the Funnel Web looked like a tornado, so they were making connections from the visual representation to a prior experience. Another child said that they have seen the Orb Web in their grandmother's garage.

I chose to use the book after the students had some concrete experience with the spiders and had thought about spider webs. While I was not overly concerned with students learning the specific names of the webs, the vocabulary was appropriate and students could see pictures of the webs as well as make connections to previous experiences. One way to improve upon this lesson would be to have actual webs to aide in the students comprehension of the web shapes. However, the various web shapes are difficult to find. Searching the playground area or space outside of the school could produce a web for the class to observe.

After reading the book I asked students to recall some of the spider webs from the text. I wrote all of the remembered webs on the board and I asked a few of the students to draw a picture that resembled the web next to the word. The visual representation was more important than the vocabulary word, but I wanted both to be shown on the board. Having documented their new learning, I decided to postpone the final phase of the learning cycle until day three.

Application

I used this final stage of the learning cycle as an opportunity for students to demonstrate what they have learned over the two previous days.

Application Stage Material List

- Construction paper
- Glitter
- Glue
- Model Spider
- Blank sheets of paper
- Coloring materials

DAY 3

I began the third and final day of the spider lesson by activating prior knowledge. To review the prior days' learning, I asked questions such as:

- “What have you learned over the past two days?”
- “What is important about the body features on the three organisms we observed?”
- “What types of webs did we talk about?”
- “What do the webs look like?”

After the students discussed what they learned throughout the spider lesson, I asked students to again draw a spider as detailed as they could. I handed out a blank sheet of paper to each of the students and gave them directions to draw a spider with all of the appropriate physical features on them. As students drew, I walked around and provided encouragement to add as much detail as possible. After approximately ten minutes, I asked students to pick two body parts they included on their spider and write one sentence for each body part explaining why those parts are useful for the spider. For my lower level students and struggling writers I wrote a sentence frame as a model. It looked like the following

- “The spider has _____ that allow it to _____.”

By asking the students to write a complete sentence about their learning, I was able to check for understanding on whether or not the students understood the connection between structure and function.

I compared students' final drawings to their initial drawings from the first day of the lesson. Students were able to distinguish that a spider has two body parts, eight legs, two fangs and other important features such as the spinnerets. I was surprised by the fact that the majority of the students also drew eight dots as eyes on the spider. This was something that we only touched on briefly.

One final activity had each student create their own spider web with glitter and glue. A model spider was then placed on the web to put in the hallway for the other classes to see! Before passing out any of the materials I explained the directions and provided students with an example piece that I had previously made. It was a large web mimicking the shape of an Orb Web. I had drawn the web with glue and then sprinkled glitter on the glue to make it shine. I wrote Orb Web on the top of the paper and placed a plastic spider in the middle of the web. The students were excited to start.

I dismissed the students table by table to grab a glue bottle, a spider and a large piece of paper. I spread the glitter on the glue at a back table to eliminate a mess once they completed their webs. The students could utilize the examples on the board that were created while reading the *Spiders* book the day before. As students completed their webs, they brought

them back to me and chose the glitter color they wanted and I sprinkled the glitter on. I asked each student to tell me what web they chose to mimic and then they wrote that name on the top of their sheet.

Finally, the webs went in the drying rack and the spider lesson was complete. I looked at the name of each student's web as well as the shape to assess the student's comprehension on the last content covered. Both the drawing of the spider's physical structure as well as the web art project provided me with an idea of students' understanding of the spider lessons. The students demonstrated their knowledge level of the physical features on a spider and they could draw a specific web discussed in class. Through speaking with some of the students about their webs, I also noticed that they would use the vocabulary word, spinnerets, while describing their webs and the creation of the spider's home.

Differentiation

There were ELL students in my classroom, many of whom could not express their knowledge in English. Importantly, having used real spiders, models, and pictures provided an

important scaffold for ELL students and all of my students. Such concrete representations allow students to engage with the content without having to worry about complex language. In the group discussions, I made sure to place ELL students with English speaking students so they would be in an environment in which they could practice communicating.

In whole group discussion, I informed specific students that I would like them to share their ideas to the class. This provided my ELL students and general education students ample time to gather their thoughts. I would not startle them by calling their name. Also, I had a lot of pair-share conversations which provided everyone in my class an opportunity to discuss their thinking in a safe environment.

Conclusion

The learning cycle model helped me create a structure and purpose for my lesson. I knew which direction I wanted to go. However, I also utilized information the students provided me to explore alternative routes. Responding to student ideas is not easy, but is necessary to help students develop deeper understanding of science concepts.

References

Gibbons, Gail. Spiders. (1994). New York: Holiday House, Inc.
National Research Council. National Science Education Standards. (1996). Washington, D.C.: National Academy Press.

Courtney King is an English Language Learner teacher working with first and second grade students at Jensen Elementary in the Urbandale Community School District. Courtney graduated from Drake University with a B.S. in Elementary Education with endorsements in ESL, Reading and Unified Early Childhood and Special Education. Contact Courtney at courtneyperryk@gmail.com.