

The “Science” behind a Successful Field Trip to the Zoo

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Abstract:

A field trip to the local zoo is often a staple in many elementary school curricula. Many zoos offer free entry to local teachers and their students. Teachers take students on field trips to enrich the curriculum, make connections to what students are learning in school, and provide students with meaningful learning experiences (Kisiel 2007). However, teachers often struggle to find a balance between allowing students the opportunity to freely explore exhibits of their choice for their preferred time periods and making students adhere to a rigid lesson that limits their opportunities to wonder and discover but reinforces or introduces content that fits their curriculum. By providing students with opportunities to explore and develop their science process skills through multidisciplinary lessons, teachers can help students funnel their curiosity into meaningful learning experiences. The following lessons are examples of how to incorporate student curiosity and excitement about animals into grade-level appropriate activities for students before, during, and after zoo field trips. Each activity takes place over three class sessions, ranging from 30 min to 1 hr per session. The activities are divided into three grade levels: K–1, 2–3, and 4–5.

Keyword: elementary school | field trips | multidisciplinary | zoo | education | teacher education

Article:

PRE-FIELD TRIP PREPARATION FOR THE TEACHER

It is essential that the teacher be familiar with the layout of the zoo and knows how he or she would like to plan these activities for students. Fortunately, many zoos will allow a teacher to visit at no charge prior to a class field trip. I recommend contacting one's local zoo to find out if it is possible to visit ahead of a scheduled class trip. Doing a pre-visit will allow the teacher to

determine what will be reasonable for students to accomplish during a field trip. The teacher will also be able to look for key markers for each activity, such as signs at the exhibits describing the animals and their habitats, exhibits that are closed or unavailable for student observations, restroom stops, first aid stations, and central meeting points for groups. Teachers are encouraged to try out the activities and develop a reasonable timeline and schedule for the field-trip day, taking into consideration how large the zoo is, whether or not transportation between exhibits is available, and how long and far the walk is between exhibits.

The teacher should also consider preparing materials for the zoo trip in advance. A parent volunteer, student teacher, or teacher assistant can easily gather the materials needed for each activity below. In the past, teachers have found it helpful to carry a bag filled with extra supplies (should a group lose or break an item), copies of the schedule for the day, maps of the zoo, walkie-talkies, and other standard field-trip items such as first aid supplies. Check sheets for each of the paired grade levels have been provided here (see Figures 1–3).

Items Needed for Field Trip	Packed?
1. Zoo maps (1 per chaperone)	
2. First aid kit(s)	
3. List of chaperone cell phone numbers (1 per chaperone)	
4. List of student groups (1 per chaperone)	
5. Sunscreen/Insect repellent	
6. Student medications	
7. Student emergency contacts	
8. Snacks/Drinks	
9. Tissues	
10. Student name tags	
11. Student data collection sheet (1 per group)	
12. Pencil (1 per group)	
13. Digital Cameras (1 per chaperone)	

FIGURE 1 Grades K–1 zoo field-trip checklist.

Items Needed for Field Trip	Packed?
1. Zoo maps (1 per chaperone)	
2. First aid kit(s)	
3. List of chaperone cell phone numbers (1 per chaperone)	
4. List of student groups (1 per chaperone)	
5. Sunscreen/Insect repellent	
6. Student medications	
7. Student emergency contacts	
8. Snacks/Drinks	
9. Tissues	
10. Student name tags	
11. Permanent marker (1 per group)	
12. Cloth measuring tapes (1 per group)	
13. Scissors (1 per group)	
14. 10 meters ribbon (1 per group)	
15. Gallon bags to hold materials (1 per group)	

FIGURE 2 Grades 2–3 zoo field-trip checklist.

Items Needed for Field Trip	Packed?
1. Zoo maps (1 per chaperone)	
2. First aid kit(s)	
3. List of chaperone cell phone numbers (1 per chaperone)	
4. List of student groups (1 per chaperone)	
5. Sunscreen/Insect repellent	
6. Student medications	
7. Student emergency contacts	
8. Snacks/Drinks	
9. Tissues	
10. Student name tags	
11. Clipboards (1 per student)	
12. Pencils (1 per student)	
13. Map a Habitat Sheet (1 per student)	

FIGURE 3 Grades 4–5 zoo field-trip checklist.

LOWER ELEMENTARY (GRADES K–1)

National Science Standard: Grades K–4, Life Science

As a result of activities in grades K–4, all students should develop an understanding of

- The characteristics of organisms.

Introduction

Children love running from exhibit to exhibit and looking at the different animals. In fact, students spend more time looking at the animals than they do reading related signs and information provided at the exhibit (Ross and Gillespie 2008). Fortunately, their eagerness to see “everything” possible can be put to great use. Animals move in a variety of ways, based on their body structure, environment, and adaptations for survival. Zoologists often monitor animal movement and behavior to learn more about a species.

In this activity students will identify the different ways that animals at the zoo move. They will take a picture of an animal and tell how it moves to create a page for a class book about their trip to the zoo, integrating the use of science and language arts learning goals.

Teacher Background

Animals across the world move in a variety of ways based on body structure, environment, and adaptations. Students will identify one animal they would like to watch at the zoo and come up with a word to describe how that animal moves. For example, a cougar *paces* and an elephant *strolls*. Students will take a picture of their animal. When they return to the classroom, students will create a class book about the ways in which animals at the zoo move. Additional examples could include a snake *slithers*; a zebra *gallops*; the river otter *slides* and *swims*.

The amount of information included in the class book will depend on the ability level of the child. First grade students are more likely to include more details than those in kindergarten, as they are already familiar with sentence structure and word sense. Kindergarten students may need assistance coming up with describing words for how the animal moves and writing the words on paper. Students can use the computer to write about their pictures, which can easily be downloaded from a digital camera and put into a word-processing document.

Materials

- Paper
- Coloring items
- Computer access

- Digital cameras (one per group of four students)

Procedure

1. Pre-Zoo (30 min)

Share with students video clips that show the ways that animals move. Examples might come from the *Planet Earth* DVD series, for example, or various zoo Web sites, such as the National Zoo's (http://nationalzoo.si.edu/Animals/WebCams/default.cfm?hpout=webcam_link&xtr=). Have students come up with as many describing words as possible that explain animal movement, and write them on the board. Students could also demonstrate those movements to ensure understanding of the word. Some of the words may include hop, run, swim, fly, gallop, walk, stomp, prance, and slither.

Explain to students that on their zoo trip they are going to be zoologists and study how animals move. Students will need to pick at least one animal that they would like to watch at the zoo. Let them know that they will take a picture of their animal and write about it when they return from their zoo trip.

2. At the Zoo (1 hr)

Chaperones should be assigned a group of four students. Ask the chaperone of the group to hold the camera and student data sheet to help keep track of student data. It may be helpful for each student to wear a name tag with both his or her name and the name of the animal that he or she wants to observe so that students can remember (with chaperone help!) which animal each chose to watch. It would be ideal for the teacher to group students based on the locations of the animals selected for observation within the zoo, making it easier for the chaperones to monitor their students within a particular habitat or area of the zoo.

Each student should watch his or her animal and take a picture of it. While at the zoo, have the student come up with a few words to describe how his or her animal moves. The chaperone can record student observations on the data sheet (see Figure 4) or allow the student to do so if he or she is able. If more time is permitted, have students use the camera to take a short video of the selected animal in movement. They can use the video for an activity on return to the classroom (see the Extensions section of this article).

Student Name	Animal Observed	Describing Words

FIGURE 4 Chaperone collection sheet for student group.

3. Post-Zoo (1 hr)

After returning from the zoo, ask the technology specialist at your school to download the student pictures into documents for the class to use. You may also choose to do this or have a parent volunteer help. Give each student a sentence strip with the following written on it:

My animal is a/an _____

The _____ moves by _____

Cut the data sheet, collected from each chaperone, into strips for each student. Give each student the data that he or she collected at the zoo so that he or she can fill in the sentence blanks.

Show students their animal on the computer in the word-processing document. Have each student type his or her sentence from the sentence strip directly under the animal's picture. If a student has a grasp of typing and can do so easily, allow him or her the opportunity to change the font and font color. Each student should put his or her name on the page.

Once all students have completed their pages, create a class book on the trip to the zoo. Share the book with the class and allow students to read it during quiet reading times.

Discussion and Findings

In this activity, it clearly helped to give each chaperone a clipboard with the pencil and data sheet ready for use. Student name tags, with the name of the animal, also help the chaperone to recognize where each student needed to collect data. Grouping students according to the animals selected also made it easy for chaperones to plan what areas of the zoo to focus on, as all students were grouped according to their animal's location at the zoo.

In some cases, it may be easier for the teacher to print copies of the photographs and give them to students to write about. Each student can then type up his or her sentence and glue the picture to the page. It may be difficult to get all of the pictures downloaded and grouped by students to type information in a timely manner.

Extensions

- Students can choose to create an ABC book or informational book based solely on their animal.
- Students and teachers can read books about animals and their movements, such as *Move!* by Robin Page and Steve Jenkins (2006). How are the animals in the stories that they read similar and different to what they saw at the zoo?

- The teacher should select student-made videos of animals moving. When showing the videos to students, slow them down so that students can watch the deliberate actions of each of an animal's limbs. Do students see any patterns in the way that the animal walks? For example, do both front legs move at the same time, or both back legs, or does one leg move at a time, or do one front leg and one back leg move together? Are the legs moving on the same side of the body or opposite sides of the body? Have students create visual representations of the animals' movements and locomotion patterns.

Assessment

- Determine if students correctly described the animal's movement by reviewing the data collected.
- Determine if a student correctly wrote his or her sentence by reviewing his or her page from the class book.

MIDDLE ELEMENTARY (GRADES 2–3)

National Science Standard: Grades K–4, Life Science

As a result of activities in grades K–4, all students should develop an understanding of

- the characteristics of organisms and
- organisms and environments.

Introduction

Animals come in a variety of sizes based on species. Students will recognize the difference in size of the many species of animals found in their local zoo. Students often have difficulty understanding measurement without a visual representation. The animals found in many zoo exhibits—such as elephants, giraffes, and different species of bears—are a great deal larger than the average second or third grader. Students will visit the animal exhibits and use measuring tapes and ribbon to measure the height/length of each animal. After returning to the classroom, students will use the ribbons to create a life-size length/height chart of the different species of animals.

Teacher Background

This activity allows children to measure and compare the true size of the animals they see in the zoo by creating a life-sized bar graph of the height of each animal. Zoos usually provide their guests with the length or height of each animal, located at the various exhibits around the zoo. Although students recognize the largeness of many zoo species and would consider them to be big animals, especially compared to their own size, they may be surprised to see how much the height of animals varies from one species to another and how these animals compare to other animals found in the zoo.

Materials

- Cloth measuring tapes (standard measurement, one per group)
- Scissors
- Permanent marker (one per group)
- 2.54 cm wide (or wider) ribbon, approximately 10 m long per group
- Gallon bag to hold materials (one per group)
- Butcher paper
- Coloring items
- Pencils

Procedure

1. Pre-Zoo (45 min)

Review with students how to appropriately use measuring tapes. Encourage students to practice measuring items around the school for accuracy, including themselves, a classmate, and items in the classroom. Explain to students that they will be measuring how tall each species of animal is based on information provided at the animal's exhibit at the zoo.

Review with students the animals they will see at the zoo. Help students decide which groups will measure each animal so that as many samples are taken at the zoo as possible. Again, take care to explain to students that the exhibit signs for each animal list the animal's length, which is

used to measure the animal from toe to tail. Because humans walk on two feet and most animals do not, students will use the length of the animal to imagine how tall it would be were it to stand on two legs.

Demonstrate to students how to measure out the length of the animal using the ribbon and cloth measuring tape. Use an animal students might see, such as a box turtle, for everyone to practice. Once each student has measured the ribbon to the correct length, he or she should cut it and then write the name of the animal measured directly on the ribbon with the permanent marker, as well as his or her own name. This will allow students to carry around a minimal amount of equipment while collecting data at the zoo. Students can keep the ribbons in the group's bag for safekeeping.

2. At the Zoo (1 hr)

Once at the zoo, each student group should measure and record the length of each of their assigned animals. Ideally, each student will be responsible for measuring the length of one animal so that everyone in the group is held accountable for the assignment. Students should remember to check the measurements carefully, cut the ribbon to the appropriate length (found in the animal's exhibit), and write the name of the animal on the ribbon using the permanent marker.

3. Post-Zoo (1 hr)

Students will continue to work with their zoo groups for this activity. Once students return from the zoo, allow each student to use his or her ribbon measurements to create life-sized pictures of the animal that he or she measured using the butcher paper and coloring items. Students can cut out these life-sized models (see Figures 5 and 6).

Figures 5 & 6 are omitted from this formatted document.

In their zoo groups, have students create a large graph using butcher paper. Label the x-axis "Animals" and the y-axis "Length." Mark the y-axis in 1-m increments, up to 5 m. This may easily be done on clear floor space or using the wall of the classroom. Have each student put his or her model of the animals on the graph, labeling the x-axis with the name of the animal. Once each group completes its graph, tape the graphs together on the board to make one large, comparative graph of all of the different animals observed.

Invite students to share each animal with the class. Which animal was the tallest? The shortest? How do similar species of animals compare with one another; for example, the polar, grizzly, and black bears? Were there any surprises to the students when it came to an animal's height?

Discussion and Findings

Using the gallon bags (with zip-closings) makes it easy for the chaperones to help keep the student materials organized. A clear safety concern is having a young child carry scissors as he or she runs around the zoo, and using the bag keeps the scissors safely in the hands of the adult. The bags also make it easy for the teacher to organize materials and plan for the post-zoo lesson after the field trip. Each student needs to write not only the name of the animal on the ribbon that he or she measured, but also his or her name, too, so that each student gets the correct ribbon piece back to make the model at school.

Extensions

- Have students research the height of their animals in the wild. Is there a difference between the height of the animal measured at the zoo and how tall it would be in the wild? Why might there be a difference? Have students make a second model of the animal using its height in the wild and put it next to the zoo model to compare.
- Invite students to look for information about how the body structure of their animal is best adapted to fit in its natural environment. For example, have students consider the giraffe's long neck and its long legs that enable it to reach the leaves on the acacia tree. Students can also examine the feeding habits, ways that animals obtain their food, or methods of behavior that their animal uses to establish dominance. Can students come up with other adaptations of their animals, either behavioral or physical, that better enable the animal to be successful in their environment? Students may begin their search for information prior to the field trip, use their observation skills while on the trip, and continue to add more details and share their findings after their return.

Assessment

- Compare students' models of the animals with the height of each animal recorded at the zoo to ensure correct understanding of how to measure.
- Ask students to compare animals using the graph; assess student understanding of size comparisons based on student responses.

UPPER ELEMENTARY (GRADES 4–5)

National Science Standard: Grades K–4, Life Science

As a result of activities in grades K–4, all students should develop an understanding of

- the characteristics of organisms and

- organisms and environments.

National Science Standard: Grades 5–8, Life Science

As a result of activities in grades 5–8, all students should develop an understanding of

- regulation and behavior,
- populations and ecosystems, and
- diversity and adaptations of organisms.

Introduction

The environmental factors, such as temperature and terrain, found at a local zoo can be very different than those in the geographic locations native to each animal. Keeping this in mind, zoologists must create realistic habitats for each animal exhibit that meet an animal's biological needs.

In this activity, students will identify the four needs for survival of animals and design a habitat based on the polar bear's natural ecosystem. In their habitats, students will include plants native to the polar bear's habitat such as Arctic poppy, food and water sources, and appropriate accommodations for hunting, resting, and solitude.

Teacher Background

This activity analyzes the physical environment created for animals at the zoo, particularly the terrestrial components. Habitats have been designed to replicate animals' native habitats as closely as possible. A polar bear exhibit, for instance, includes the water and land that a polar bear needs. However, it is unlikely that the zoo where the polar bears are kept is naturally in an Arctic location geographically, so one must consider that temperatures and vegetation vary greatly from that found in the Arctic. In fact, in addition to extreme temperature and vegetation differences, the food sources found for polar bears in captivity vary greatly from those found in their natural habitat.

Animals are physically adapted to their environments, including the geographic makeup and climate. If we transplant them to a different climate, what can we do to ensure their survival? Do the animals change their behavior to better meet their needs in a new environment? How can zoos ensure the well-being of their animals when creating such drastic changes in environment?

In this activity, students address the following questions:

1. What are the four basic needs of animals for survival?
2. How is the zoo addressing the change in climate from the Arctic to its current location for the polar bear?
3. How can the polar bear exhibit at the zoo be modified to ensure the polar bear's success?

To answer these questions, students will consider their own habitats and needs for survival. They will study the polar bears and map out the current polar bear exhibit at the zoo. Students will research the polar bears' native habitat, the Arctic, and design an improved habitat for the polar bears based on their observations and findings.

Materials

- Paper
- Pencils
- Clipboards

Procedure

1. Pre-Zoo (1 hr)

Have each student draw a floor plan of his or her house and identify the items in the house that he or she needs to survive. (These are food, water, shelter, and space.) Explain to students that this is a habitat and that, like people, animals also need a habitat to survive.

Take students outside to look for signs of animals and their habitats. Common school habitats will include birds' nests and insect homes. Allow students the opportunity to identify where each animal's needs for food, water, shelter, and space are being met.

Inform students that the zoo will be "redesigning" the polar bear exhibit and that students are going to create what they would consider to be the ideal habitat for their polar bears. Pose the following questions for your students to answer in their science journals or class discussions:

1. What are the four components of a habitat that you will need to include in your exhibit?

2. What will you need to know about the polar bear to design an exhibit?
3. What similarities and differences exist between the Arctic climate and the zoo's climate that might affect polar bears?

Allow students time to research the polar bear and its needs, including temperature and climate, plants in the Arctic, polar bear size, polar bear interactions, food needs, and space needs. Encourage students to consider how an animal's body is adapted for survival. What sort of physical and behavioral characteristics do polar bears have for better survival rates? Based on their research, what must students consider in regard to those characteristics when designing a polar bear habitat? To integrate math, inform students that a polar bear exhibit requires 5,000 m² of space for one polar bear, plus an additional 1000 m² of space for each additional polar bear. How many square meters must students include in their exhibits to ensure that they meet zoo requirements?

2. At the Zoo (35 min)

Have students complete the “Map a Habitat” activity from the North Carolina Zoo's Teacher Clipboard Pack

(<http://www.nczoo.org/education/EducatorResources/ClipboardActivitypack.pdf>). In this activity, students draw an overhead view of a zoo exhibit and label each part (see Figure 7 for a sample of a student's Map a Habitat activity). Have students map out the polar bear exhibit from an aerial perspective, including where the polar bears get food, water, space, and shelter. Encourage the students to take notes on what they like about the current exhibit and what they would change if they were to redesign the exhibit in their science journals. Begin by counting how many polar bears are in the exhibit on their field trip. Each student should also observe the polar bear and its actions, taking notes on how the polar bear catches food, in what areas of the exhibit the bear tends to stay (and hypothesizing why), how the bear interacts with other bears in the exhibit, and other characteristics that may need to be considered in an exhibit design. Students should begin to think about how they will redesign their polar bear exhibit after returning from the zoo.

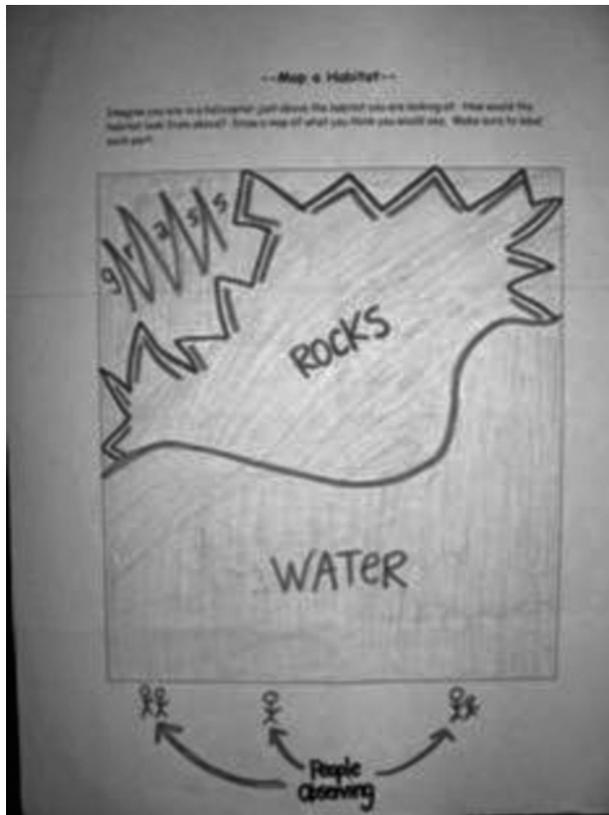


FIGURE 7 Sample of a student's map, a habitat activity.

3. Post-Zoo (1 hr)

Allow students to work with partners or small groups for this activity. Once students return from the zoo, allow them to complete their research on the polar bear and to design a habitat to meet the polar bears' needs. Students must consider the physical characteristics of the bears and how the zookeepers will maintain the exhibit when designing the habitat. They must also consider the terrain and water for the polar bears as well as limitations on the bears' abilities due to size and physical composition (see Figures 8 and 9 for samples). Wonderful information on the needs of polar bears in zoos can be found in the Project Wild activity, "Polar Bears in Phoenix?"



FIGURE 9 Sample of student-designed polar bear habitat.

Allow students to present their new habitat designs to the class. How have students taken what was researched in their initial questions and seen at the zoo and applied it to their new design? Can students identify the four needs of animals for survival in their diagrams?

Discussion and Findings

It is clearly helpful for the teacher to research appropriate books and Web sites for student research in advance. The teacher can also encourage chaperones to show students how to find information on the zoo exhibit signs, a zoo feature students often overlook.

Extensions

- Allow students to vote on the best polar bear habitat by using a poll. Students can create bar graphs in math to represent the number of votes each exhibit received.
- Have students write a letter to the zoo explaining why their habitat would be the ideal habitat for polar bears. Have students mail the letter, along with their exhibit design, to the zoo.

Assessment

- Ask students to identify the four needs of an animal for survival, either orally or in their pictures.
- Review student habitat designs to identify how they meet the needs of the polar bear and how they address students' initial questions about polar bears.

Conclusions

The zoo can be used not only as a place for exploration and creating curiosity in students, but also as a location for meaningful science instruction. Through the use of engaging, hands-on activities, students can begin to explore their ideas about wild animals and build on these ideas both before and after a zoo field trip. I found these lessons successful in teaching my preservice teachers how to integrate meaningful instruction into field trips. Many of the interns took the lessons to their schools to try with their elementary students on zoo field trips and were pleased to report that students enjoyed each activity.

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