NATIONAL GEOGRAPHIC

GEO-INQUIRY PROCESS: EDUCATOR GUIDE

ASK
COLLECT
VISUALIZE
CREATE
ACT

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GEO-INQUIRY PROCESS

ASK   COLLECT   VISUALIZE   CREATE   ACT

CONTENTS

PHASE 1: ASK

PHASE 2: COLLECT

PHASE 3: VISUALIZE

PHASE 4: CREATE

PHASE 5: ACT

ASSESSMENT

APPENDIX

CREDITS

INTRODUCTION
TO GEO-INQUIRY

More than ever, our world is interconnected. In order to make smart decisions and function effectively, today's students need to understand how the complex and dynamic human and natural systems interact. The study of geography is essential to the comprehension of how our world works.

Geography, the study of places and the relationships between people and their environments, seeks to understand where things are, why they are there, and how they develop and change over time. Geography offers students two avenues to understand the world, human and physical geography. Human geography studies cultural, political, technological and social systems, and physical geography studies Earth's physical and natural systems.

Geographers, those who study geography, observe the world in spatial terms, and are interested in three basic questions: Where is it? Why is it there? Why care? They seek to describe the world using the knowledge, skills, and tools of the discipline, such as maps, globes, graphs, photography, video, and remote sensing images. These instruments are suited for different purposes and illustrate a range of information including showing patterns, interactions and change over time.

The Geo-Inquiry Process endeavors to help students develop the skills, knowledge, and tools of a geographer. It provides a systematic way to investigate and understand the world through the patterns, processes, and interactions between human and natural systems and then to act on their conclusions.

The Geo-Inquiry Process is a five-step method designed to teach the skills necessary to think and reason geographically, and includes asking Geo-Inquiry Questions, acquiring geographic information, organizing and analyzing information, and using the information to answer Geo-Inquiry Questions for informed action. The Geo-Inquiry Process relies on geographic perspective as a foundation, offering students a unique lens to analyze space, place, and the interconnections of systems in our world. Geographic perspective is interdisciplinary and allows for the examination of complex issues at various scales. Think of scale as being the "zoom lens" of geography. The scale can be local, regional, or global, but young students do best to start with the local level—in their classrooms, schools, school grounds, and neighborhoods. By using a geographic perspective with the Geo-Inquiry Process, students begin to connect complex components, see patterns, and make connections as they look at the world differently in order to make informed predictions, well-reasoned decisions, and take action.
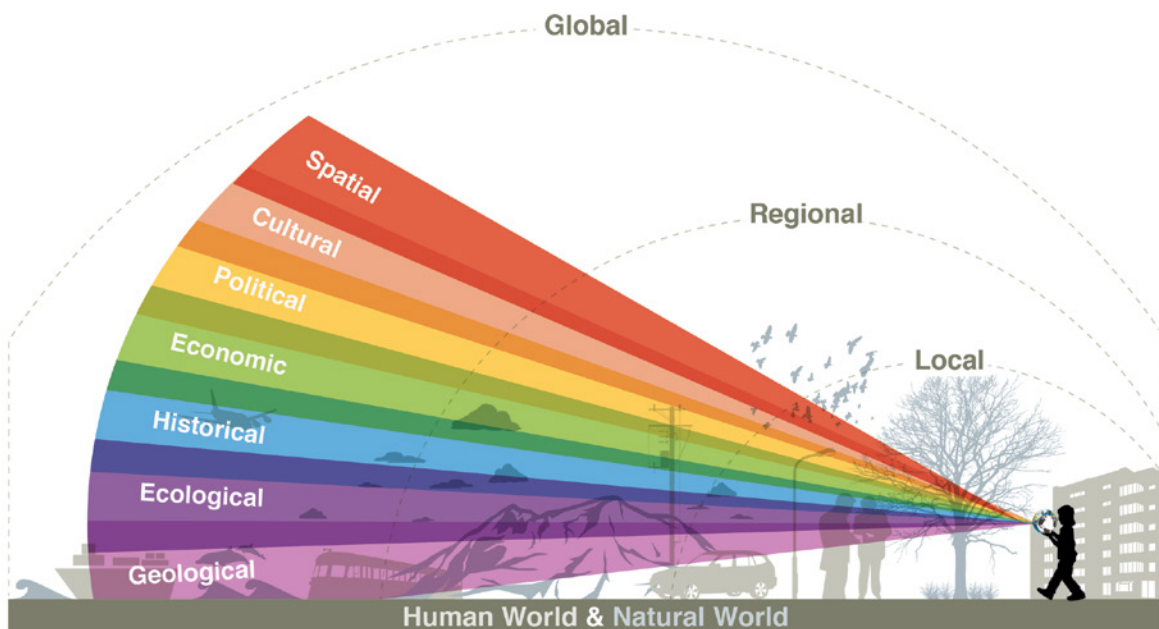
PLANNING
FOR THE PROJECT

COLLABORATION ACROSS DISCIPLINES

The Geo-Inquiry Process is a cross-disciplinary process, so consider enlisting the assistance of other teachers or school staff, such as librarians, to support this project. Students could choose to address a variety of issues and collect social science or scientific data, develop graphs, and capture photographs or video. They will write text and use technology tools. Science, art, math, technology, and other teachers could assist in planning and implementing the project.

The Geo-Inquiry Process is designed to build on student questions that reflect their interests and issues in their local community. This process is project-based, authentic, and experiential in nature. It requires students spend time asking, investigating, organizing, analyzing, and creating. This process is best done in groups rather than individually. For young students, we suggest collaborating as a whole class to answer one Geo-Inquiry Question, taking care to select a topic that interests most students.

THE GEO-INQUIRY PROCESS

Phase 1: Ask The entire class will participate in framing the Geo-Inquiry Question. First students will hear about how a real National Geographic Explorer follows the Geo-Inquiry Process to ask a compelling question, collect data to find the answer, create a story, and then act upon their discovery in order to create meaningful change in the world.

Next students will begin to explore their school surroundings in search of compelling topics of their own through a news survey, brainstorming, or asking the community. Together the class will formulate a final Geo-Inquiry Question that will drive the rest of the project.

Phase 2: Collect Students will learn how to collect and document data to answer their Geo-Inquiry Question through research, polling, surveying, observation, interviewing, and taking photos and videos.

Phase 3: Visualization In this phase, students organize their data visually and analyze it in order to answer the Geo-Inquiry Question.

Phase 4: Create Students decide how they want to share what they learned. They storyboard a plan for presenting the answer to their Geo-Inquiry Question. And then they create their story as either a multimedia presentation, skit, or poster.

Phase 5: Act Just like a real National Geographic Explorer, students use their Geo-Inquiry Story to invoke meaningful change in the world around them. In this phase, they will learn how to communicate their ideas.

CREATING A PROJECT PLAN

Read through the Educator's Guide before starting the class on the Geo-Inquiry process. Consider the following:

- What possible issues or problems might students address at school?
- What data will students need to collect?
- What type of presentation and/or action might students take?

Consider timing as far as duration of each phase and the school calendar. Do you want to do a short project all at one time or intersperse the project throughout a longer period of time? Are there places you can align the Geo-Inquiry process to your regular lessons?

PLANNING
FOR THE PROJECT

SETTING GOALS

Set class learning goals for the project. What process skills do you want students to practice and/or master? What subject-specific content do you want them to understand at the end of the project? As your students work through the Geo-Inquiry Process, ask reflection questions such as:

- What did you learn as a team?
- What do you feel proud of as a team?
- What was difficult to do as a team?
- What can you do better as a team?

TRACKING PROGRESS

The timing of the Geo-Inquiry project is up to you. Most teachers designate a certain amount of time per week to work on it over months of the school year. There are many opportunities to align with your regular lessons in reading, writing, science, social studies, and math. Given the length of time it will take to do a complete Geo-Inquiry project, we recommend using a tool to track progress that is very visible to students. Consider posting the five phases on a wall with as much space as possible below each phase where you can post sample work, due dates, tasks, team assignments, and so forth.

GEO-INQUIRY PROCESS

ASK   COLLECT   VISUALIZE   CREATE   ACT
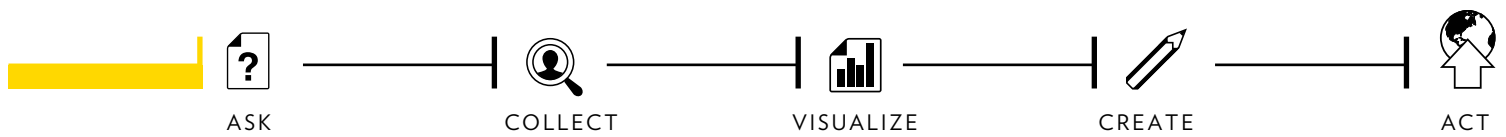
Five phases of Geo-Inquiry Process

Then as you start each new day's activity, remind students of what they've already done and how it is connected to what they are doing next. You may have a student quickly summarize the progress or even simply point out where they are in the time line.

PHASE 1: ASK
DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

PHASE 1: ASK
DEVELOPING A GEO-INQUIRY QUESTION

ASK   COLLECT   VISUALIZE   CREATE   ACT

Asking good Geo-Inquiry Questions is at the heart of the Geo-Inquiry Process. These activities can be used to help students develop their skills in asking geographic questions and to give them a chance to explore a variety of local issues or problems. These materials are designed to help narrow in on a specific topic or issue, and frame geographic questions into a Geo-Inquiry Question that will drive the project and be the focus of the subsequent phases of the project.

INTRODUCING THE CONCEPT

1. Explain to students they will be doing a Geo-Inquiry project. The purpose of the project is to investigate something in or around their school that is important to them, which they can help make better.

   Display "Geo-Inquiry" large enough for everyone to see it. Underline "Geo" and explain that it is short for "geography." Then ask students if they've ever heard the word "geography" and what they think it means. Guide the discussion to define "geography" as "places around us." Explain that geography can be a small area around us like the classroom, the school, the playground, or the neighborhood. Or it can be bigger like the whole town (name your town). Or bigger like a country or the whole world (point to a world map). Underline "Inquiry" and define it as "question." Explain that Geo-Inquiry then means asking questions about what is happening in places around us. But a Geo-Inquiry project is even more special than asking a few question. It is investigation, exploration, and being part of making a change to better the world.

   Tell students that just like geographers, they will explore the world around them. They will learn to identify and describe places and their purposes. And then they will ask a Geo-Inquiry Question. A Geo-Inquiry Question has three main questions:
   • Where is it?
   • Why is it there?
   • Why care?

2. For example, have students think about their classroom. What geographic questions might they ask about the classroom? Model some simple examples, such as: *Where is our whiteboard? Why is it there?* Students may say the whiteboard is there because the teacher put it there. So ask, *What if I put it over here instead?* and point to a place where the whiteboard would be difficult to see. The idea is to get students to describe location (*Where is the whiteboard?* in front of the classroom), to think about the purpose of location (*Why is the whiteboard there?* so students can see it easily), and to evaluate the significance and importance of location (*Why care?* If the whiteboard was moved, we wouldn't be able to see it.).

PHASE 1: ASK
DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

Have students choose an object in the classroom, sit in front of the object, and draw it. Have students talk about what is near the object. Encourage the use of location vocabulary such as "behind, in front of, next to, near, far, left, right," etc. Then have students add one more object to their drawing as they see it in the classroom. Students can present their drawings to the class, using language frames such as:

I drew _____.
It is near _____.
It is next to _____.
It is behind _____.

The rest of the students can then point out where the object is in the classroom.

Students can level up this activity by working in pairs. They sit together in front of at least two objects, say a desk and bookshelf. One student draws the desk, the other draws the bookshelf and then they switch papers and draw their object again but onto their partner's paper. Monitor placement of objects in the drawings to get a sense of students' comprehension of location. Students can continue this activity, adding more objects.

3. To practice asking geographic questions, ask about features in the classroom, including those the students drew. *Where is _____? Why is it there? How would it be different if we moved it here?* You can then ask about areas of the school such as the playground, parking lot, auditorium, cafeteria, gym, garden, office, etc. For example, *Where is the playground?* (outside, behind the school) *Why is it there?* This question may be difficult for younger students so you can make the point of location importance by using a silly example. *What if the playground was in the school office?* Students will begin to see that things are located with purpose. A slide in the principal's office would take up too much space, interrupt the principal's work, be hard for students to play on, etc.
More sample questions:

Where are the windows in our classroom?
Where are the lights in our classroom?
What sounds do we hear in our classroom? Where do they come from?
Where are the fire alarms? Why?
Where are the water fountains?
Why is the office near the front door?
How are the first and second floors different?
Why is there a fence around the playground?
Why is the parking lot here?
How are the classrooms different from each other? Why?
Where are the exits to get outside?

PHASE 1: ASK

DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

How is the cafeteria arranged?
Where are the trash and recycling bins?
Where do cars and busses drop kids off? Pick them up? Why?
Why is the teacher's lounge located where it is? Gym? Auditorium? Art room?
Where are the plants and trees around school? Why?
What places are in the neighborhood of school?

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet
• Geo-Inquiry Questions worksheet

4. Now that students have explored what is around them and why, it's time to dig deeper into the connection between humans and geography. This means asking what should and should not be in certain locations and how we can make things better. Model how to create questions using the Geo-Inquiry Questions worksheet. Cut the worksheet as indicated by the dashed lines. Make three piles. Pile one has the question frame: *"How can we"* and *"How should we."* Pile two has action words. Pile three has words to complete the questions. Depending on the level of your students, you may want to reduce the number of choices in piles two and three and/or add your own. The objective is to get students thinking about geographic questions, issues, and problems.

STUDYING A MODEL

CASE STUDIES

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet
• Geo-Inquiry Story Rubric
Educator's Guide Appendix
• Vocabulary
NatGeoEd.org
• Case Studies

1. Tell students that you are going to share a Geo-Inquiry project of a real National Geographic Explorer. Read aloud the No More Plastic Waste Case Study. For the first read, allow students to listen for enjoyment. If possible, project the passage for students to follow along and also to view the images.

2. Tell students you are going to read the passage again but this time they are going to listen for particular information. Share the Geo-Inquiry Story Rubric. Note that this is the same rubric that students will use for their own Geo-Inquiry project. Use the Vocabulary list to define words such as *geography, inquiry, data, survey, observation, interview, visuals, graphs, map, multimedia presentation, skit, audience, call to action,* and *action plan.* As you read aloud the case study, model how to complete the rubric. Depending on the level of your students, you may want to focus on only one or two sections of the rubric.

PHASE 1: ASK

DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

STUDENT WORKSHEET 2   NAME: _____   DATE: ___

OUR STORY

Geo-Inquiry Question

How can we solve the problem of plastic waste

in the United States?

What is the problem?

[students draw or write about plastic waste]

ASK COLLECT VISUALIZE CREATE ACT   GEO-INQUIRY STORY RUBRIC

STUDENT WORKSHEET 2   NAME: _____   DATE: ___

OUR STORY

Data

☐ survey   ☑ photos
☑ videos   ☑ interviews
☑ observation   ☐ other _____

The data help answer the Geo-Inquiry Question.

☺ ☹

ASK COLLECT VISUALIZE CREATE ACT   GEO-INQUIRY STORY RUBRIC

Annotated sample Geo-Inquiry Story Rubric pages 1-2

STUDENT WORKSHEET 2   NAME: _____   DATE: ___

OUR STORY

Visuals

☐ graphs
☑ maps
☑ other   notes and sketches

The visuals tell the Geo-Inquiry Story.

☺ ☹

ASK COLLECT VISUALIZE CREATE ACT   GEO-INQUIRY STORY RUBRIC

STUDENT WORKSHEET 2   NAME: _____   DATE: ___

OUR STORY

Sharing the Geo-Inquiry Story

The audience is   American consumers   .

☐ multimedia presentation   ☐ skit
☐ poster   ☑ other   postcards

The story connects to the audience.

☺ ☹

The story is important.

☺ ☹

The story is important because   trash can be
a resource if we learn how to recycle.   .

ASK COLLECT VISUALIZE CREATE ACT   GEO-INQUIRY STORY RUBRIC

Annotated Sample Geo-Inquiry Story Rubric pages 3-4

PHASE 1: ASK
DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

Annotated Sample Geo-Inquiry Story Rubric page 5

DEVELOPING SKILLS AND EXPLORING TOPICS

The following section has various ideas for exploring what students know and want to know about where things are in their school, why, and why they should care. As you and your students explore, guide discussions to focus on possible issues that students could work on to impact change. For example, no shade trees, not enough recycling bins, littering, confusing school signs, wildlife or plant life being harmed by people or harming people, cars idling and creating pollution, food being left out and attracting bugs in the school, etc.

NEWS SURVEY

One way to come up with topics is to familiarize yourself and students with school news. Do you have a school newsletter, website, or bulletin board? Try to find one or two current school events or news items, such as a food drive, garden project, upcoming assembly, event to raise money, or new rule. Young students who are new to the school system are often focused on their immediate circle of friends and the classroom. They may be unaware of bigger news happening in school unless it is brought to their attention. But an awareness of wider surroundings and news is key to a Geo-Inquiry project.

As you share and discuss the school news topic, use a T-Chart to take notes on what students know and want to know about the topic. Model making questions from the "want to knows." Take note of any topics that could become the Geo-Inquiry Question for the class project.

PHASE 1: ASK
DEVELOPING A GEO-INQUIRY QUESTION

ASK   COLLECT   VISUALIZE   CREATE   ACT

BRAINSTORMING

Another way to come up with topics is to brainstorm. Tell students that "brainstorming" means they will list everything they can think of. Then choose an activity to have students brainstorm topics.

- Share and/or elicit from students a few topics of interest, such as animals, plants, places, or how things work. Have students use a T-Chart to draw or write what they know and what they want to know about one of the topics. Students share their "knows/want to knows" as you tally them on chart paper for all to see. Then choose the three most common "want to knows" and discuss why they are interesting.

- Students use a T-Chart to draw or write what is inside the classroom and what is outside the classroom (or other comparisons such as inside and outside the school, back and front of the classroom or school, etc.). Conduct a whole class discussion while you take notes on chart paper: *What do we know? What do we want to know?* Then choose the three most common "want to knows" and discuss why they are interesting.

- Do a Four Corners activity. Post chart paper with the name of school locations (for example, schoolyard, hallways, classroom, cafeteria) in each of the four corners of the classroom. Small groups go to each corner and draw or write what they know about the location, then switch and draw or write what they want to know, and then switch and draw or write why they care about the location. The third switch can be substituted with a discussion if writing or drawing why they care is too difficult.

If necessary, simplify the activities by having students dictate answers as you write on chart paper and discuss. Conclude all the activities by modeling how to make questions of the "want to knows." Take note of any topics that could become the Geo-Inquiry Question for the class project.

ASKING THE COMMUNITY

Another way to come up with topics is to ask the community.

1. Come up with 1-2 questions that students can ask school community members to determine what those individuals think are important issues. Below are some examples, but it would be best to use questions that are specific to your school, location, or current events.
   What do you wish was different at school?
   What should change at school?
   How can we make _____ better?
   How would you change _____?

ASK — COLLECT — VISUALIZE — CREATE — ACT

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet

• Poll Template

2. Tell students they will first learn to ask one person the question. Have them imagine a particular teacher, the principal, or maybe the librarian. Tell students that everyone is going to practice asking and answering the question. First you will show them how. With a member of the class or an older student, role-play asking and answering the question. Be sure to note the answer on chart paper for all to see or record it on your phone.
After the role-play, ask students to repeat the question and try to recall the answer. Then ask them what they noticed during the role-play. Guide students to comment on your body language, formality, and speaking clearness. Then either have pairs come to the front of the class and role-play asking and answering or allow pairs to practice as you walk around and monitor. Offer feedback on body language, formality, and clearness. Ask students to repeat the answer they heard.

3. Next choose a group of people who will answer the question such as students, teachers, or any school community member. You can role-play asking five students the question. Note answers on chart paper or record answers with your phone. Or you can use the Poll Template and model how to do a poll. You can find additional information in Phase 2, but note that you will write four answers on the poll sheet and put checks in the numbered boxes as you get answers. Have students work in groups of six. Each student asks the other five students the question. Monitor and provide feedback.

Annotated sample poll

4. Now that students have practiced, arrange for them to meet with one person or a group of people to ask the question. You may want to arrange for small groups to take turns leaving the classroom with supervision rather than the whole class at the same time. Help students note the answer if they are not asking the poll questions.

5. After students have answers, conduct a discussion in which students talk about what they learned by speaking to school community members. Take note of any topics that could become the Geo-Inquiry Question for the class project.

CHOOSING THE GEO-INQUIRY QUESTION

Now it is time to choose the Geo-Inquiry Question. Most likely you will choose the final question yourself and present it to students. But if you want student participation in the final choice, write 2–3 Geo-Inquiry questions based on the class work from this Phase 1: Ask section. Use the Geo-Inquiry Question Flow Chart on the next page to assure the questions are specific, actionable, thoughtful, something that cannot be answered by simply looking at a map or searching the Internet, and something that genuinely interests students. Share the questions with the class, discuss, and have students vote on which one they would like to answer. This will be the driving question for the rest of the project. At this age, it is recommended that the whole class work on the same Geo-Inquiry Question.

PHASE 1: ASK

DEVELOPING A GEO-INQUIRY QUESTION

ASK — COLLECT — VISUALIZE — CREATE — ACT

GEO-INQUIRY QUESTION FLOW CHART

Have you written a question?

↓ YES

| Is the question rooted in an opinion? | NO → | Research your issue or topic and revise your question. |

↓ YES

| Could the question be answered with a yes or no? Another simple answer? | YES → |

↓ NO

| Is the question rooted in an opinion? | YES → |

↓ NO

| Is the question easily answered with an Internet search? | YES → |

↓ NO

| Can you collect data or information related to the question? | NO → |

↓ YES

| Does the question require multiple information sources? | NO → |

↓ YES

| Does the issue or topic impact the present or future human or natural environment? | NO → |

↓ YES

| Does the question encompass the need to understand various perspectives? | YES → | You have a Geo-Inquiry Question! |

Be sure to post the final Geo-Inquiry Question on your progress tracker under the Ask phase. If you are using a wall to post progress, you can also display any other worksheets or documentation that represent this phase. Make it a big deal that the class has completed this phase and they are now ready to move on to the next phase. Celebrate this milestone!

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK COLLECT VISUALIZE CREATE ACT

A student collects data through observation. ©CGN089/Shutterstock

GEO-INQUIRY PROCESS RESOURCES
Educator's Guide Appendix

• Vocabulary

Once students have their Geo-Inquiry Question, they will need to conduct background research and then acquire the data that will enable them to answer their questions. The possibilities for types of information students will need to gather and ways in which they can gather this information are diverse. The activities in this section are designed to help students build solid background information about their topic through questioning, research, and data collection; to make sense of what types of data may be helpful to them; to identify data collection methods; and to design data collection tools. Since students' data needs will depend on the issue they are investigating and the questions they asked, you should select the activities that best apply to your specific project.

UNDERSTANDING GEOGRAPHIC INFORMATION
Introduce students to the vocabulary terms listed in the Vocabulary handout in the Appendix of this packet. Not all of these terms will apply to every project, so this list is just to familiarize students with terms they may encounter in their data collection.

GATHERING BACKGROUND INFORMATION
Doing research and collecting data with younger students is most productive when students focus on one step at a time. Consider doing discreet activities on separate, consecutive days.

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

As you finish each activity, post students' work on your progress wall in the Collect section. Then as you start each new day's activity, remind students of what they've already done. You may have a student quickly summarize the progress or even simply point out where they are in the time line.

1. Display the Geo-Inquiry Question. Have students copy it onto their Background Information worksheets. Students will write or draw everything they know about the question on the worksheet. But first generate a brief discussion about the topic. For example, if your topic is litter on the playground, ask: *When we see that litter, what do we already know about it?* Responses could be: students drop candy wrappers on the ground, there are trash cans but kids aren't using them, some litter blows in from the neighborhood, I sometimes drop litter without thinking about it, someone from the school has to go out and clean it up, etc. Be sure to save these early worksheets to compare against what students know at the end of the Geo-Inquiry project.

2. They will now think about what they need to know in order to answer their Geo-Inquiry Question. To generate a "need to know" list, students can work in small groups to discuss and write and/or draw on the Background Information worksheet. Or you can conduct a whole class discussion, writing topics and questions on chart paper for all to see. Come to this activity prepared with a list of your own essential need-to-know questions. As you monitor students' work or lead the discussion, make sure everything on your list is covered.

3. Have a whole class discussion to elicit ideas about people or groups in the school community with knowledge and expertise on the topic or issue. Contacting experts, organizations, or school officials will be your responsibility but having students participate in identifying people will make them more invested in the project. This is a good place to align to lessons you may be doing on jobs, workers, and community places. Consider incorporating a shared writing activity in which the class writes a letter or email to an expert. You might share the response you get from the experts with students. See Contacting Community Experts in the Appendix for email and letter formats.

4. As appropriate, find books, magazines, websites, and primary sources on the topic. Learning about the topic with these resources can be as simple as students looking through them as you capture ideas on a concept web or more involved like listening to texts read aloud, viewing videos, and discussing. This is another good place to align to your reading, social studies, math, or science lessons.

5. As the class learns information that will help them answer the Geo-Inquiry Question, post notes and include the source information (book title, magazine title, page numbers, website, interviews, etc.). You could also post source titles on a wall with space underneath each one. Students can draw and label what they learn from each source and put their work under the source from which they learned the information.

6. If possible add sources that include ways in which the issue or topic has already been addressed so students can see previous solutions.

7. Post this sentence frame: Our Geo-Inquiry Question is important because _____. Have students turn and talk with a partner or a small group. Elicit ideas and discuss, coming to a consensus on the best completion of the sentence.

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

SAMPLE BACKGOUND INFORMATION

TOPIC	GEO-INQUIRY QUESTION	NEED TO KNOW	EXPERTS
Bats	How should we live with bats around school?	Where do the bats live? What do they need? Are they dangerous? Can people harm them? What problems do they cause? How do we protect them? When do they have babies? What do they eat?	zoologist veterinarian city animal control
Signs	How can the signs in our school help students get around better?	What kinds of signs are there? Who needs signs? Why? Who makes signs? Are there rules about signs? What size should signs be? Who decides to put up a sign?	sign makers principal architects designers school workers
Recycling	How can we stop wasting so much paper in our school?	What is mostly thrown away? Where are the trash and recycling bins? Do people put things in the correct bin? What happens after trash leaves the school? Does it matter if we waste paper? How is paper made? How is paper recycled?	custodians recycle plant trash plant city workers ecologist manufacturer

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IDENTIFYING NECESSARY DATA
INTRODUCE DATA TYPES

1. Using the Need-to-Know list, decide what types of data might be helpful to answer the Geo-Inquiry Question. Background information can be researched in books, websites, and videos. Geospatial data can include statistics, surveys, observations, scientific measurements, interviews, images, and video tied to a geographic location. For example, to find out more about living with bats, students could read books and articles about local bats and interview a local bat or wildlife expert. To find out more about the effectiveness of signs, students could make a map of sign locations and people at school who use the signs, such as students and teachers.

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet

- Data Collection Templates:
  Write and Draw
  Survey
  Tally
  Poll
  Observation Log
  Species Card
  Daily Log

2. Choose 2-4 data collection methods to teach. These do not have to be the final methods used in your Geo-Inquiry project. Ideally you would teach all the data collection methods that could apply to the project and have students choose after unpacking the Geo-Inquiry Question in the next step. Take into account your students' levels. For younger students, you may want to focus on fewer choices. Conduct a separate lesson on each collection method, including ample time for students to practice on a small scale. See the Data Collection Templates.

UNPACKING GEO-INQUIRY QUESTIONS

1. Modeling how to deconstruct the Geo-Inquiry Question can help students look at it in a different way and help them better see what kinds of data they will need in order to answer it.

2. First, identify and define terms used the question. For example, in this question: *How can the signs in our school help students get around better?* define "signs" as labels that help people find places.

3. Next, ask students what they think they will learn from answering this question. For example, *We will learn what makes a sign helpful and useful.*

4. Use the statement of what they will learn to write simpler questions or Need-to-Knows that underlie the more complex question they are asking. One might ask: *Where are the signs in our school? Why do we have signs? Do we need them? Which signs are good? Which signs are not good? Why?*

5. Conduct a guided discussion in which students identify the data they will need to determine the answer to each of the simpler questions in step 4. For example, ask: *Where are the signs in our school?* Write responses on chart paper for all to see. Once a valid data collection method (such as a walking tour and drawing or photographing signs with the teacher noting locations) is noted, go on to the next question. *Why do we have signs? Do we need them?* (valid data collection could be hypothesizing or experimenting with what happens when we take the sign down) *Which signs are good? Which signs are not good? Why?* (valid data collection could be a survey of sign users or maybe interview someone who has made a sign)

6. Make a final data list in two columns. Column one has Need-to-Knows and column two has the data collection method to find that information.

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

Students discuss their Geo-Inquiry Question with National Geographic Explorer Joe Cutler.

COLLECTING DATA
DATA COLLECTION: RESEARCH

Now that students have a list of what they need to know, determine what can be learned from research using books, websites, and video as opposed to data collection in the field. Display the book, website, or video and read aloud parts or pause to model how to look for and note specific information.

Allow time for students to explore media on their own. Younger students who aren't reading yet should flip pages, scroll websites, or view videos with the purpose of observing. Tell them to look for 2-3 things that relate to the Need-to-Know list. Other students can be given specific questions from the Need-to-Know list to try to focus on.

1. Using the Need-to-Know list as a guide, steer students to nonfiction books that relate. If possible, gather and create a space for these books in your classroom or visit the library, preferably coordinating with the librarian for support beforehand.
2. You can also display and demonstrate how to navigate and get information from topic-related websites that you pre-select. Or students can also scroll through such websites individually or in small groups.
3. Students can also do research through watching videos that you pre-select. Make sure they are short and clear. You may want to show a video several times—once for viewing pleasure, and then each subsequent time for a specific purpose (eg., *Look carefully to see what the racoon's nest looks like. Listen carefully to find out what the problem is.*)

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

As the students find information, help them post it (a drawing, written text, dictated text, photo, book title and page reference, website name, video name, etc.) on the progress wall near the Need-to-Know list.

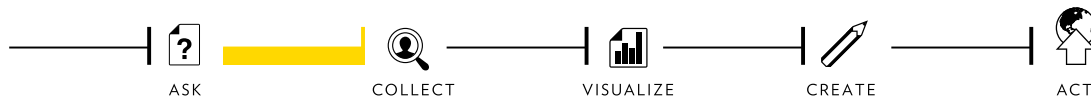### COLLECTING PHOTOGRAPHIC AND VIDEO DATA

1. In Phase 4, students will develop a Geo-Inquiry Story about their project. Think about the images or video that will be needed for that prior to data collection. Determine if you or your students (or both) should be responsible for taking photos or videos. Consider that you may not be able to return to get photos or videos later. It's better to have more images and footage than you need rather than not enough.

2. Prepare by reading Taking Photographs and Video, Photography: The Basics, Videography: The Basics, and the Photograph and Video Release Form in the Appendix.

3. Examine some photos with students and discuss each one. Ask: *Which do you like best? What grabs your attention? Why?* You can address the composition: *Where are the objects, people, or animals in the shot (foreground, background, in the center, or to the sides)? Is there movement? What story is the picture trying to tell?*

4. If you intend to have students capture photos or videos, plan for several individuals to do so in case of equipment malfunction and to take shots from multiple perspectives. If students will be publishing or publicly presenting their work, ensure you have the proper permissions from any individuals in their photos or videos.

COLLECTING SURVEY OR POLL DATA

1. For surveys or polls you will need to prepare a question. See Developing a Survey in the Appendix.

2. Remind students of the Need-to-Know questions associated with the survey or poll. Post or project a survey or poll form—your own or the Data Collection Template: Survey or Poll in the student packet. Using your prepared question, model how to fill in the question and answer choices. Students can copy the information onto their own forms. (You can also hand out pre-made forms.)

3. Before students go into the field, have them practice asking the question and checking the boxes (in pencil to be erased or make practice copies) with you and students in the classroom.

GEO-INQUIRY PROCESS RESOURCES

Educator's Guide Appendix
- Taking Photographs and Video
- Photography: The Basics
- Videography: The Basics
- Photograph and Video Release Form

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet
- Data Collection Templates:
  Survey
  Poll

Educator's Guide Appendix
- Developing a Survey

PHASE 2: COLLECT

ACQUIRING GEOGRAPHIC INFORMATION

ASK · COLLECT · VISUALIZE · CREATE · ACT

Annotated sample survey and poll

COLLECTING INTERVIEW DATA

1. For interviews, you will also need to prepare questions. Either post or have students copy 1-3 questions to refer to as they interview.

2. Have partners practice asking and listening to answers as you walk around and monitor. Randomly ask listeners to repeat the answer they heard. Provide feedback on clarity and attentiveness.

3. Prepare for real interviews by arranging in advance, letting the person know the questions so they can prepare, and asking permission to record the interview. Choose student roles— someone can introduce the group, some students can ask questions, and some can listen for answers.

4. When students do the real interviews, try to have an adult record the interview. When you are back in the classroom, you can replay the audio, transcribing and discussing the answers. If recording is not an option, try to have an adult help take notes or at the very least, discuss the interview as soon as possible so students don't forget answers.

PHASE 2: COLLECT
ACQUIRING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

COLLECTING SCIENTIFIC DATA

1. Students can collect scientific information through field tests and observation.

2. Choose 1-2 of the Need-to-Know questions associated with either the tally, observation log, species card, or daily log. Post or project one of these forms—your own or from the Data Collection Templates in the student packet. Describe how to the collect data and model how to complete the form.

NAME: _____ DATE: _____

TALLY   trash at school

		Total
paper	IIII	4
wrappers	ЖЖ II	7
food	I	1
plastic	ЖЖ ЖЖ	10

Grand Total ___ 22

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS

NAME: _____ DATE: _____

OBSERVATION LOG

I see ___ birds _____
I hear ___ birds _____
I smell ___ grass _____
I touch ___ grass _____

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS

Annotated sample data collection forms

NAME: _____ DATE: _____

SPECIES CARD

Name ___ squirrel
Date ___ May 1, 2021
Location ___ in Elm tree

Name ___ butterfly
Date ___ June 2, 2021
Location ___ on flower

Name _____
Date _____
Location _____

Name _____
Date _____
Location _____

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS

NAME: _____ DATE: _____

DAILY LOG   temperature

	SUN	MON	TUE	WED	THU	FRI	SAT
time	6:00	12:00	12:00		12:00	9:00	

(graph values: 100, 90, 80, 70, 60, 50, 40, 30)

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS

Annotated sample data collection forms

3. Before students go into the field, have them practice collecting data from a small sample in the classroom, such as tallying classroom supplies, observing outside the window, making species cards for a classroom or personal pet, or plotting attendance for a few days.

A final note on data collection: Carefully consider methods for recording and organizing data. Plan for collecting and organizing data prior to beginning this project. Create any recording tools (e.g., a spreadsheet, table, or image folder) before students collect data and have a plan to save data in multiple locations.

Be sure to post some of the students' collected data on your progress tracker under the Collect phase. If you are using a wall to post progress, you can also display any other worksheets or documentation that represent this phase. Make it a big deal that the class has completed this phase and they are now ready to move onto the next phase. Celebrate this milestone!

PHASE 3: VISUALIZE
ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK   COLLECT   VISUALIZE   CREATE   ACT

PHASE 3: VISUALIZE
ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT
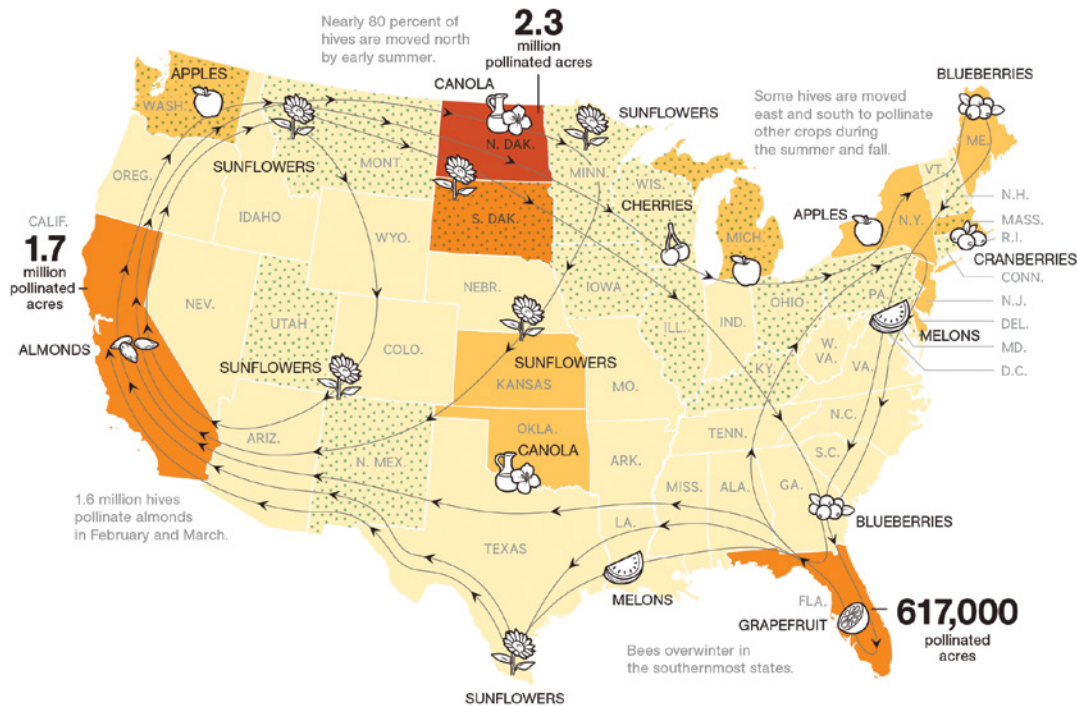
Data visualization is key to telling a story. Check out this National Geographic map of bee movement across the continental United States. Map courtesy of Virginia W. Mason, Jason Treat, and Matthew Twombly/NG Staff; Meg Roosevelt. Sources: Nicholas Calderone, Cornell University; National Agricultural Statistics Service; Economic Research Service, USDA.

Collecting data is only one step in answering Geo-Inquiry Questions. This section guides students through organizing the data they have collected, visualizing that data in a way that conveys an understanding of the issue they are researching, and putting that data on a map or displaying it with visuals. The Geo-Inquiry Process focuses on using the geographic lens as a way to better share data and tell a story.

CREATING ROUGH DRAFT MAPS

Having students create a working map up front emphasizes the geographic nature of the Geo-Inquiry Process and serves as a way to organize data as it is collected.

At this young age, students will be starting with pictorial maps that depict small areas and working up in elevation, perspective, and area size. For more on map skills for elementary students, see this collection of resources from National Geographic: nationalgeographic.org/education/map-skills-elementary-students/.

PHASE 3: VISUALIZE
ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

1. *Students start by drawing a place in a one-dimensional pictorial view.*
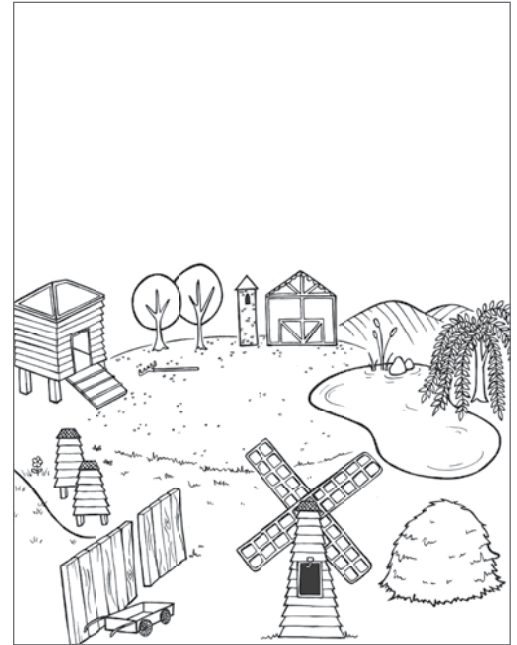
2. *As students begin to understand perspective, they show things in the background and foreground.*

3. *Next students aim to add more depth to perspective, more details, and connecting roads.*
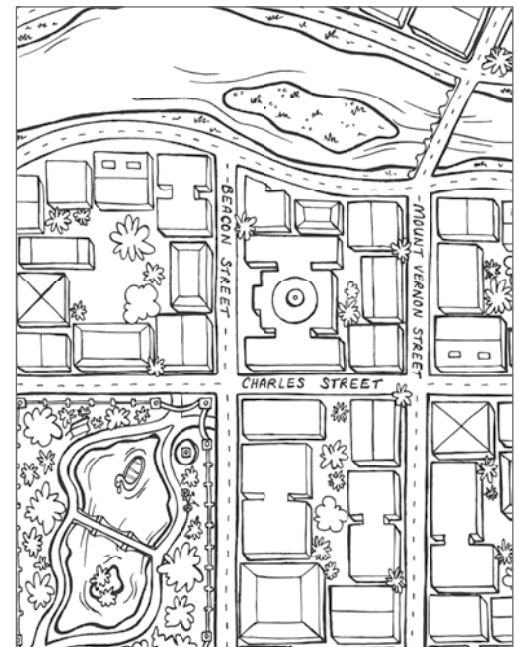
4. *Second and third graders draw aerial maps, but even kindergarteners and first graders can sketch basic aerial views of 3D models.*

PHASE 3: VISUALIZE
ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

1. Build a 3D table or floor model of the place to be studied to answer the Geo-Inquiry Question. For example, if your Geo-Inquiry Question is about the lack of shade trees around the playground, students will want to build a 3D model of the playground, including any trees.
   • Plan a visit or walking tour of the place. For younger or less experienced students, choose a smaller place.
   • Collect data for your model. You and students can draw or take photos of key features. Students should each sketch or photograph a different feature. Assign numbers in sequence to each image so they can be placed in correct order in the classroom model.
   • Print photos or do drawings from the sketches. Use paper that can be glued onto boxes or can be folded to stand up.
   • Create a base on the floor. This could be a large poster board, cardboard, tabletop, sandbox, etc. Add some basic features such as a hallway, door, road, parking lot, or park before students add their own.
   • Have students place their features in the model using the sequence numbers and discussing placement.
   • Leave the model up as long as possible for students to explore, add to, and change after follow-up visits to their place and further data collection.

2. When students are ready, have them draw a map from the model. The map can be one-dimensional pictorial, elevated perspective, or aerial—or a combination of the three. You may want to create the basic outline with a few key features and then make a copy for each student. Students can then draw in features.

3. At this point the maps are rough draft and meant for collecting data. But while it is good practice for students to sketch their own rough draft maps, younger students may get frustrated when they put work into it and find out it's not the final map. For that reason, you should create one map for the whole class—no need to perfect it—the basic outline and key features will suffice. Depending on your project, you may want to create the map on the whiteboard, a projected page, or a digital document.

4. As students collect data, you can model how to add it to the rough draft map. For example, if students were mapping signs in their school, you could color code categories, such as those they can read and those they cannot. You can mark locations of where surveys were conducted; you can add highlights, quotes from the survey, or a chart or graph synthesizing the data. You can write directly onto the map or number the locations and jot information on numbered sticky notes, so they can be moved around more easily.

5. Students can also add drawings or photographs to the map. Make sure the map is on large enough paper or poster board so there is space to add images around the map with lines leading to reference locations.

6. As you and students add data to the map, monitor correctness. If you see something is missing, plan another visit to the site to check, and then add it to the map.

PHASE 3: VISUALIZE

ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

ORGANIZING GEOGRAPHIC DATA

How students organize collected information is dependent on the data type. The goal of data organization is to place students' materials into a format that allows them to easily see patterns or trends.

1. Select the type of data visualization to best show the data students collected.

NAME: _____ DATE: _____

LINE GRAPH   students in a library

| | 9:00 | 11:00 | 12:00 | 2:00 |

(y-axis values: 5, 10, 15, 20, 25, 30)

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS

NAME: _____ DATE: _____

BAR GRAPH   favorite places in school

(y-axis values: 0–10; categories: playground, gym, classroom, cafeteria, library, hallway)

ASK — COLLECT — VISUALIZE — CREATE — ACT   GEO-INQUIRY PROCESS
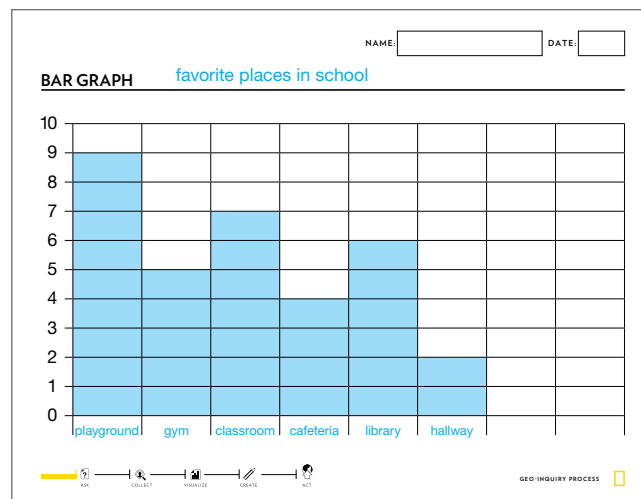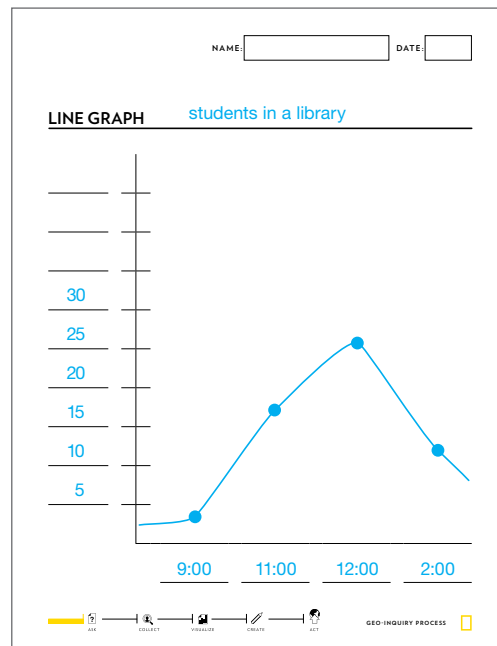
Bar graphs show data using bars to represent values. Using a grid makes it easier to color in the bars.

ASK — COLLECT — VISUALIZE — CREATE — ACT

PICTURE GRAPH 1 critters at school

NAME: DATE:

birds   worms   ants   crickets

GEO-INQUIRY PROCESS

PICTURE GRAPH 2 ways kids get to school

NAME: DATE:

	1	2	3	4	5

Number of students

GEO-INQUIRY PROCESS
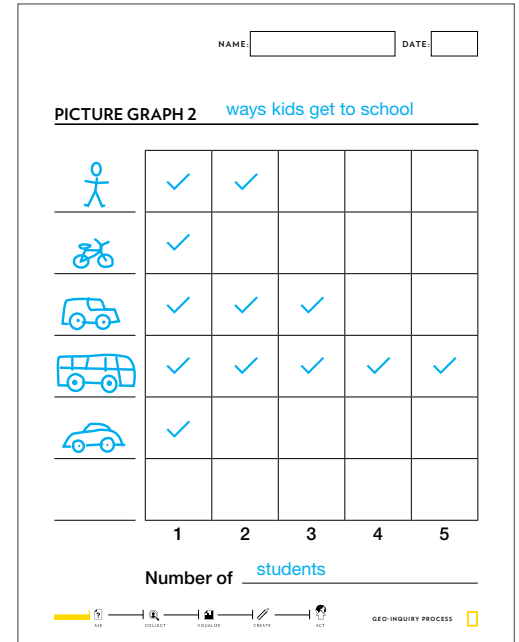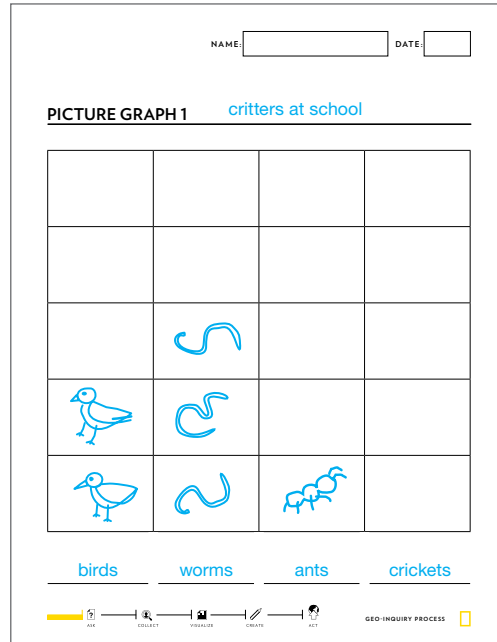
Picture graphs are similar to bar graphs, but students can use pictures as data points or graph labels.

DAILY LOG temperature

NAME: DATE:

	SUN	MON	TUE	WED	THU	FRI	SAT
time	6:00	12:00	12:00		12:00	9:00	

GEO-INQUIRY PROCESS
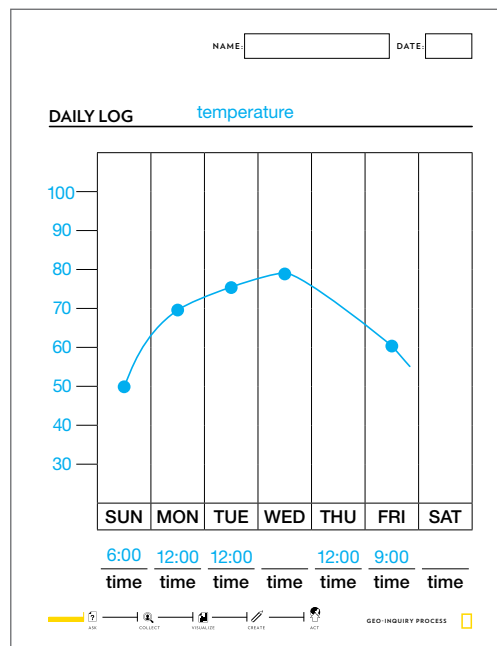
Line graphs show how something changes in value, usually over time. Plotting data points along a horizontal and vertical axis and connecting those points with lines creates a line graph.

PHASE 3: VISUALIZE
ORGANIZING AND ANALYZING GEOGRAPHIC INFORMATION

ASK — COLLECT — VISUALIZE — CREATE — ACT

2. Distribute blank copies of the Data Visualization Template you've chosen. Post or project the template for the class to follow along as you use the data collected to make the graph. For example, if students tallied the number of four different kinds of signs, you could use a bar graph to compare the total number of each sign. Write the sign names at the bottom of the graph. If each student did their own tally, collect them and show how to add up the total. Put the highest number (rounded off) at the top left side of the graph. Mark off numbers below that in 10s or 5s down to 0. Show how to plot the total of each sign type and then color in the bar.

3. Students should practice by doing the same as you did. You can build on this with other data. For example, if students surveyed sign users to find out which of the four signs were most effective, you could model how to make a picture graph that shows each of the four signs and how many students voted for each one.

4. You may consider partnering with a math or science teacher for the data visualization lessons.

ANALYZING GEOGRAPHIC DATA

Using the visual representations, examine data for patterns and trends and try to comprehend what is displayed. Data analysis is dependent on material collected. Guide students to recognize trends and to ask questions to better understand how or if those patterns relate spatially, and how they answer the Geo-Inquiry Question.

1. At this point, you probably have a lot of student work in your classroom—answers to Need-to-Know questions, a 3D model, drawings, a map, charts, and graphs. Tell students that it is time to look at all the work they've done and see if they can use it to answer the Geo-Inquiry Question. Not all data collected will help answer the question. Make sure students understand the key ideas so far:

    What is our Geo-Inquiry Question?
    What data did we collect? Why?
    What does our map show? Why?
    How did we show our data? Why?

2. Then ask students what they notice and offer your observations if they don't note a pattern. For example *What do you notice about the recycling bins? I noticed that all of the recycling bins are in front of the office*. Also guide students to see breaks in patterns that are surprising, such as *I noticed that all the doors have room number signs except this one. I wonder why*. More guiding questions include:

    What do you notice about _____?
    Let's count all the _____. And now all the _____.
    Where is most of the _____?
    Why are there no _____ here?
    What is located near _____?
    The graph shows that the most/the least _____.

3. Consider using color schemes or symbols to display patterns clearly. Other techniques are circling high values in one color and low values in another color.

4. When you and your students finish analyzing their Need-to-Know answers, map, and visual data, you should be able to answer the Geo-Inquiry Question. Do a shared writing activity in which you elicit input from the students to write the answer and a summary of evidence. For example:

   Our Geo-Inquiry Question is How can the signs in our school help students get around better? *The answer is that changing the placement of a sign will help students. We examined 14 signs. We surveyed 33 people. We learned what makes an effective sign (One that is visible, has a clear message, and is helpful). Our data shows that one sign is not effective. This is a sign that is mostly for kindergarteners, but it is placed so high up that they cannot see it.*

5. If you cannot answer the Geo-Inquiry Question, you might revisit the data, adjust maps and graphs, or conduct more research to help see the information in a different way. Or, you can still look at the data gathered to see if there is a story to tell.

CREATING FINAL MAP VERSIONS

Once students have answered the Geo-Inquiry Question, work together to create a final map that illustrates the solution or proposed solution and tells the Geo-Inquiry Story. Model how to examine the map, surveys, interviews, graphs, and any other research and choose the best evidence to support the Geo-Inquiry answer. Depending on your project, use the below as needed.

1. Model making a rough outline of the Geo-Inquiry Story. Ask "reporter's questions." Who is our story about? What is our story about? Where does our story take place? When does our story take place? Why is our story important?

2. Look at the map for the clearest patterns that answer the Geo-Inquiry Question and support the story. Decide if everything is needed to get the point across. Not everything you gather is always critical to conveying the answer to the Geo-Inquiry Question. Cut any information that does not answer the Geo-Inquiry Question.

3. Look at the photos and illustrations students collected. Include any that help people visualize the problem or solution. Maybe you need additional photos from another source. Model how to credit any photos you needed permission to use.

4. If students did interviews, find quotes that represent the person who provided the answer and support the Geo-Inquiry Story. Place the quotes on the map in a way that shows either the location of the interview or the location the person was interviewed about.

5. If students did surveys or polls, annotate the map with the final results and tallies if appropriate. For example, if everyone polled voted to have a new recycle bin placed by the lockers, mark the total number of votes on the map near the lockers on the map.

ASK   COLLECT   VISUALIZE   CREATE   ACT

6. If students created graphs, create a clean, final version with an informative title and a key to show what any symbols mean.

7. Finally, gather all the parts of the project. Work with students to lay them out in an interesting layout such as left to right, up to down, or around the outside of the map. Demonstrate how to add a key to explain any symbols. Consider adding touches such as a pathway between parts or an overall theme to the presentation.

Walk through this checklist with students to make sure the final version of the map is complete and correct.

☐ Does the map support our Geo-Inquiry Story?
☐ Is the purpose of the map clear?
☐ Is the location the map is showing clear?
☐ Is the map easy to understand?
☐ Is there a title for the map?
☐ Is there a key to explain symbols for the map?
☐ Do the colors help us understand the map or make it confusing?
☐ Are labels used to make things more clear?
☐ Is everything spelled correctly?
☐ Are pictures the right size and easy to see?
☐ Did we show that we got permission for photos?
☐ Are quotes, graphs, or other data in place?
☐ Can we read all the text? Is it easy to see?
☐ Are the authors listed?
☐ Is there a date?

Be sure to post the final map (or a photo of it if it's too big) on your progress tracker under the Visualize phase. If you are using a wall to post progress, you can also display any other worksheets or documentation that represent this phase. Make it a big deal that the class has completed this phase and they are now ready to move onto the next phase. Celebrate this milestone!

PHASE 4: CREATE
DEVELOPING GEO-INQUIRY STORIES

ASK   COLLECT   VISUALIZE   CREATE   ACT

PHASE 4: CREATE
DEVELOPING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT

National Geographic Explorer Lillygol Sedaghat uses the Geo-Inquiry Process. ©Taylor Mickal/National Geographic Image Collection

In this phase of the project, students will put the information they gathered and the data they analyzed into context and tell a Geo-Inquiry Story that answers their Geo-Inquiry Question. This phase of the Geo-Inquiry Process introduces Geo-Inquiry Stories, guides students through the process of storyboarding, and assists in tying all of the Geo-Inquiry Story elements together.

UNDERSTANDING GEO-INQUIRY STORIES
LEARNING FROM EXAMPLES

Read aloud one or two National Geographic Geo-Inquiry Story Case Studies. Note that the No More Plastic Waste Case Study was used in Phase 1: Ask to introduce students to the Geo-Inquiry Story Rubric. Reread No More Plastic Waste with lower level readers. Model how to complete the Geo-Inquiry Story Rubric and have students complete it as much as possible.

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet
• Geo-Inquiry Story Rubric

NatGeoEd.org
• Case Studies

PHASE 4: CREATE
DEVELOPING GEO-INQUIRY STORIES

ASK   COLLECT   VISUALIZE   CREATE   ACT

GEO-INQUIRY PROCESS RESOURCES

Student Resource Packet

• Preparing to Tell Your
  Geo-Inquiry Story

PREPARING TO TELL YOUR GEO-INQUIRY STORY

Display Preparing to Tell Your Geo-Inquiry Story and/or distribute a copy to each student. Ask the questions below, discuss with students, write the answers on chart paper for all to see, and allow ample time for students to copy the answers onto their own worksheets.

1. *What is our Geo-Inquiry Question?* Students can say the question in unison as you transcribe: *Our Geo-Inquiry is* _____. Then they write it on their worksheets.

2. *What kinds of data did we collect?* Students should list the types of data they gathered, for example, a survey of teachers, video interviews with students, a map of the school yard, weather changes over time, or photos of signs. Transcribe student answers using the answer frame on the worksheet. *We collected this data:* _____. Then they write it on their worksheets.

3. *What did we learn from this data?* Students should summarize what they found from their data in relation to the driving question. The summary does not need to directly answer the Geo-Inquiry Question. Transcribe student answers using the answer frame on the worksheet. *From this data, we learned* _____. Then they write it on their worksheets.

4. *How will we show the data in our story?* Guide students to think about the most effective visuals they have created and if they need to edit or design new materials. They may include all of these elements in their story, but here, they should focus on the best ways to present their data. Transcribe student answers using the answer frame on the worksheet. *We will show our data with* _____. Then they write it on their worksheets.

5. *What is the answer to our question? What is our solution?* Students should explain the answer to their question or a proposal to answer the question based on their data and research. Transcribe student answers using the answer frame on the worksheet. *The answer to our Geo-Inquiry Question is* _____. Then they write it on their worksheets.

6. *What action should we take?* Guide students to consider what they can do to solve or share the problem. Help them tie what they found through the Geo-Inquiry Process directly to the action they wish to take and use it to frame their story. Transcribe student answers using the answer frame on the worksheet. *The action we will take is* _____. Then they write it on their worksheets.

7. *Who will we share our Geo-Inquiry Story with?* The action students are encouraging should drive their choice of audience. For example, if they are aiming for a change within their school, they might speak to their teachers or principal. If they want to make others aware of the issue, they might make a poster or do a skit. Transcribe student answers using the answer frame on the worksheet. *We will share our Geo-Inquiry Question with* _____. Then they write it on their worksheets.

8. *What is the best way to tell our story?* Remind students that one way Lillygol Sedaghat told her Geo-Inquiry Story was with infographic postcards because she wanted her audience to be able to personalize the message and send it themselves. If you read other case studies, point out how the Explorer told the Geo-Inquiry Story and why it was effective for the audience. Some ways to tell Geo-Inquiry Stories include a multimedia presentation, a skit, or a poster.

PHASE 4: CREATE
DEVELOPING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT
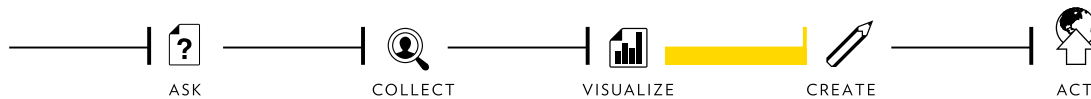
Explain each of the different presentation options. Post a T-Chart with one column labeled with a smiley face and the other with a frown face. Tell students to imagine their Geo-Inquiry Story told to the audience using one presentation option you chose. For example, imagine the outcome of the Geo-Inquiry Question: *How could the signs in our school help students get around better?* as a skit performed for the principal with the problem being acted out (maybe an adult easily reading a sign but kindergarteners struggling to see it).

Ask students to rate the presentation option with a show of hands. Tally their votes and put them on the T-Chart. Then discuss the tool's strengths, limitations, and other ideas about its usefulness. If necessary, guide students with questions like *Does it tell all of the story? Would we need to include other things like our graph or map? Who else should see this skit?* If possible, present and have students evaluate all the tools this way.

Use the results of the class poll to determine how you will complete your Geo-Inquiry Story. Complete the sentence on the worksheet: *We will tell our Geo-Inquiry Story by _____.*

STORYBOARDING

Storyboarding is an important step for planning how to combine all of your elements into a presentation. Storyboarding can help you decide how you want to share your story. It is important that your students take part in this step to see how all the pieces come together and help make decisions about what to include and what to leave out. Introduce the idea of storyboards using a cartoon with several cells. Explain how each cell has images and text that tells a scene of the story. The Geo-Inquiry Storyboard is the same idea. Each box tells what will be in that part of the story.

CREATING A STORYBOARD

1. Revisit the Geo-Inquiry Story Rubric. Explain to students that they will use it as they create the Geo-Inquiry Story.
2. Review your answers on Preparing to Tell Your Geo-Inquiry Story worksheets. Review your map and chosen graphs, photos, etc. Explain that the next step is to take all the work they have done and make a plan for their presentation. Follow the steps below for the presentation option you have chosen.

Multimedia Presentation Storyboard

1. Use the Geo-Inquiry Storyboard: Presentation worksheet in the Appendix to organize visual, audio, and text elements. Make multiple copies so that there can be one page per scene. Share and elicit input from students as appropriate.
2. Scene box: Decide how many scenes to include. Consider a new scene for each part of the story, such as an explanation of the Geo-Inquiry question, an explanation of the data, and an explanation of the solution. Number each scene. Students can help determine how many scenes, if appropriate.

GEO-INQUIRY PROCESS RESOURCES
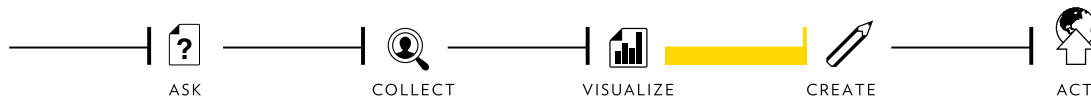
Student Resource Packet
- Geo-Inquiry Story Rubric
- Preparing to Tell Your Geo-Inquiry Story

Educator's Guide Appendix
- Geo-Inquiry Storyboard: Presentation worksheet

3. Description: Describe what the scene is. For example, "Image of the front of the school with text box beneath to introduce the Geo-Inquiry question," "chart showing animal sightings data," "map of garden plot," or "video of the interview with the principal."

4. Text or narration: Write the dialogue for the scene. Students can dictate while you record the text on the worksheet. For example, "Our Geo-Inquiry question was …." If there will also be text boxes on the screen, indicate that as well. For example: "Text 1: How should we live with bats around the school?, Text 2: Where do the bats live?."

5. Audio: If there will be sound (music or sound effects) playing while on this screen, describe it here, such as introductory music.

6. Length: If you know the length of the scene, note it; but if you are not sure yet, leave it blank. Consider how long it would take someone to read on-screen text or if the viewer would be scrolling through the story at their own pace.

7. Transition: Include this if you want a unique transition, such as a fade between scenes.

8. Other: Add any notes about the scene or any additional elements to include.

TIPS FOR COLLECTING AND CREATING STORY ELEMENTS

1. For a multimedia presentation, before you begin assembling the Geo-Inquiry Story elements, come up with naming conventions and a storage plan. For example, you may want to start each image and graphic file name with the number of the scene in which it will be used (e.g., 1_school front or 5_sign map). For sound files, it may also be helpful to include the length of clip in the file name (e.g., 3_Smith interview_2_20). Keep file names simple but descriptive. Decide if you want the text and/or narrative script to be in separate files for each scene or just as one document clearly labeled with the appropriate numbers.

2. Organize the files in folders. Create a folder for each element type or scene. Keep original and edited files separate so it is clear which is the final one.

3. Using the Tracking Geo-Inquiry Story Elements add the appropriate file name next to each element in each scene as it is ready. This will help you track when you have all of the elements ready.

GEO-INQUIRY PROCESS RESOURCES
Educator's Guide Appendix

- Tracking Geo-Inquiry Story Elements

At this point you can record and collect audio; edit photos, videos, and text; create or finalize graphic elements; and take and edit additional photos or videos. Assign tasks to students as appropriate.

PHASE 4: CREATE

DEVELOPING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT

GEO-INQUIRY PROCESS RESOURCES

Educator's Guide Appendix
• Geo-Inquiry Storyboard: Skit worksheet

Student Resource Packet
• Geo-Inquiry Story Rubric

Skit Storyboard

1. Use the Geo-Inquiry Storyboard: Skit worksheet in the Appendix. Make multiple copies so there is one page for each act in the skit. Share and elicit input from students as appropriate.
2. Scene box: Number each scene of the skit.
3. Description: Describe the action to take place in the scene. Consider how to incorporate the map and data.
4. Actors and Roles: List actors and roles needed for the scene.
5. Lines: Write the spoken lines. You can do this as an interactive writing activity in which students suggest the lines and you record them.
6. Audio: If there will be sound (music, narration, or sound effect) playing during the scene, indicate it here and describe it briefly.
7. Props: Include props needed for each scene.
8. Length: If you know the length of scene, note it; but if you are not sure yet, leave it blank. Consider how long it would take someone to say the lines and do the actions in each scene.
9. Other: Add any notes about the scene or any additional elements to include.

Students can make the props and practice lines, suggesting changes if needed. Assign roles and have students practice the skit. You'll probably have only a few characters, so create groups and have each group perform for the class on separate days for practice.

Poster Presentation Storyboard

1. Review the map and graphics you created during the Visualize step. Discuss the purpose and audience for the poster. Will the poster be displayed on its own? If so, what should be included that makes the problem, project, and call to action clear without need of explanation? If the poster is being presented, it can be designed knowing that students will explain the finer details. Then decide whether you need to adjust your map or graphics or make a larger poster. Have students work in groups to make the final poster.
2. For presentations, consider what is most important and needs the most explanation. Plan the order the students will present and how many students will do the presentation. Have the students determine what they want to say while you write their words as a script.
3. Discuss how to present: speak clearly, look at the audience. Model using the script to present, and then have students take turns to practice.

PUTTING IT ALL TOGETHER

1. Once all the elements are in place, conduct a whole class review by examining the Geo-Inquiry Story and pausing for students to complete each section of the Geo-Inquiry Story Rubric.
2. Allow time for students to recall and write the Geo-Inquiry Question on their rubric.
3. Have students discuss the problem they were trying to solve and then draw and write about it on the rubric.

PHASE 4: CREATE
DEVELOPING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT
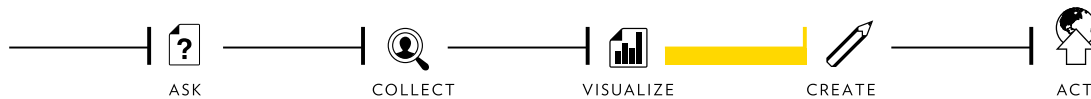
4. Have students check off the data types they used in their story. Guide a discussion on how the data helped (or didn't help) answer the Geo-Inquiry Question. Students can rate this on their rubric.

5. Have students check off the visuals they used in their story. Guide a discussion on how the visuals tell the story (or not). Students can rate this on their rubric.

6. Have student check off how they are sharing their story. Discuss how this method of sharing connects with the audience and why it is important. Students can rate this on their rubrics and also complete the sentence explaining why it is important.

7. Save the last page of the rubric for Phase 5: Act.

Be sure to post the final storyboard on your progress tracker under the Create phase. If you are using a wall to post progress, you can also display any other worksheets or documentation that represent this phase. Make it a big deal that the class has completed this phase and they are now ready to move onto the next phase. Celebrate this milestone!

PHASE 5: ACT
SHARING GEO-INQUIRY STORIES

ASK   COLLECT   VISUALIZE   CREATE   ACT

PHASE 5: ACT
SHARING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT

Students present to an audience. ©Maskot/Getty Images

The final step is for students to share their Geo-Inquiry Story and to use their story to take action. The activities in this section guide you on how students practice and present their work and reflect on the process.

REFINING AND DELIVERING PRESENTATIONS

1. Share the Geo-Inquiry Presentation Rubric with students. Tell students that this rubric tells what makes a good presentation. You will help them understand it and then, as they use their storyboards, refine their script, and practice the presentation of their Geo-Inquiry Story, they will use the rubric to make sure they have everything in place.

2. Explain what makes a good presentation.

   Preparation

   a. **Audience.** Review who they will be speaking to. Explain that speaking to peers is different from speaking to a general audience or the principal. Discuss formal and informal language and which is appropriate for their presentation. Give examples and ask students to choose which phrase would be best for friends (eg., *Hey guys! Ready to hear our story? OK, let's go!*) and which for the principal (eg., *We would like to present our Geo-Inquiry Story.*).

PHASE 5: ACT
SHARING GEO-INQUIRY STORIES

Structure

b. **Start with a bang.** The opening of the Geo-Inquiry Story presentation will be the most memorable, so start with something special! Grab the audience's attention with a colorful anecdote, amazing fact, or pivotal moment. Give examples and ask students to vote on which one would be more interesting. For example: *First the teacher told us we have to do a project so we all drew pictures.* Or much better: *Did you know there are fourteen bird nests around our school?* Have students add their opening to the storyboard.

c. **Facts and data.** Find ways to simply explain facts and data. Use analogies and metaphors to make them easier to understand, such as *as big as a 747, as small as a coin*. Also discuss how data can be made more exciting with comparisons like "There are more squirrels than students in our playground." Come prepared with a few examples relevant to the students' Geo-Inquiry project.

d. **Clarity.** Do not muddle the message with extra information. Getting students to leave out extra information that they may have worked hard on will be challenging, but it is a very important step. If possible, show students the large amount of work they have done by pointing out all that you have been posting in your classroom or maybe stacking up all the drawings, worksheets, map parts, and so on. Ask students if they think an audience will get the point if they have to read all of this. Tell students to help you select the things that will tell the story most clearly.

Voice and Emotion

e. **Ending.** The ending of a Geo-Inquiry Story should be a call to action, or what they want people to do to help them solve the problem.

f. **Make them care.** Get students to remember why they did what they did. If they cannot tell people why they care about the project, how can they expect other people to care?

g. **Speak in headlines when making points.** Just like headlines in a newspaper, short, to-the-point sentences are great for interviews and talks. Be sure to steer students in this direction.

h. **Use memorable language.** We live in a world filled with sound and imagery. Suggest colorful and detailed language to students to bring the audience into their story and to share what is unique about their world.

i. **Narrator.** Be sure to give students ample time to prepare for the narration. Have students practice with classmates, friends, family, or in front of a mirror. If possible, record students and have them listen to how they sound. Point out where you can hear the emotion in their voices and how that makes you listen more carefully. Ask them to practice speaking with emotion.

3. Using the components on the Geo-Inquiry Presentation Rubric, discuss, decide on, and post answers to these questions:
   - Who is our audience? (e.g., the principal)
   - How will we share our Geo-Inquiry Story with them? (e.g., write a letter)
   - How will we grab their attention? (e.g, tell a surprising data point such as *Every single kindergartener out of the 15 we asked could not see the sign.*)
   - What is our story? (e.g., We made a map of all the signs in main hallway, categorized them by users, surveyed 45 students and teachers, and discovered that the Do Not Enter sign on the custodian's closet was much too high for kindergarteners to see. This is an important because the closet is often left unlocked, which could be dangerous.)
   - How will we use our Geo-Inquiry Story? (e.g., to get the principal to move the sign down)
   - Why should the audience care? (e.g., safety, users want a change)
   - What is our call to action? (e.g., move the sign)
4. Finally, have students share their Geo-Inquiry Story and follow up as needed to implement their action or solution.

TIPS FOR LIVE PRESENTATIONS

- Speaking parts should be only a few words or one sentence per student to give as many students parts as possible. Encourage students to memorize their lines. Create visual cues or create a typed presentation script using large, easily readable font. Divide the script into easily identifiable sections. Distinguish each section with a number, color-coding, or print each part on a separate page.
- Give students ample time to practice. The more they practice, the more confident they will be in front of an audience.
- After practicing their presentations, some students may be comfortable enough to use prompts rather than a script for their speech. This can help them look down less often and can make the speech sound more natural.
- As students practice, instruct them to focus on different aspects of presentation, such as projection, enunciation, emphasis, body language, and making eye contact with the audience. As novices, students need to be made explicitly aware of all the skills involved in a good presentation. If you have the time, introduce these after students have gained some confidence with the language of their speech.
- Make sure students have at least one "dress rehearsal," where they can test any technology they will be using.
- If possible, record students giving their presentations so they can informally self-evaluate.

PHASE 5: ACT

SHARING GEO-INQUIRY STORIES

ASK — COLLECT — VISUALIZE — CREATE — ACT

INVITING THE AUDIENCE

- Determine the best way to let the intended audience know about the Geo-Inquiry Story and proposed action or solution. This will depend on how students plan to present their Geo-Inquiry Story.
- For any live or poster presentation, you will need to make advance arrangements to host the event. Consider the audience, available resources, and their availability in order to determine the best time, date, and place for the presentations. Once these are set, issue invitations to the target audience. Students can create actual invitations or send an email or letter to attendees.
- If students will not be presenting live, determine the best way to inform their target audience. It is best not to email large attachments to people. For this reason, it is easiest if students' work can be hosted privately on a school website. You can then send a link to the presentation along with an introductory email or letter directly to the people you hope to reach.
- If sending an attachment is the only option for sharing their presentation with a particular audience, first send an introductory email briefly explaining the project and ask for permission to send an attachment.

ASSESSMENT

REFLECTING ON THE LEARNING

1. Conduct a discussion with the whole class or in small groups, eliciting responses on the following questions:
   a. Why was the project important?
   b. What are you proud of?
   c. What do you wish you did differently? Why?
   d. What is something you learned?
   e. What do you hope happens because of the project? Why is that important to you?
   f. What more did you want to learn?
   g. Is there any other action you want to take?
2. Have students complete the Self-Evaluation Form.
3. After students have had time to reflect in writing and drawing, discuss the project as a class, using the reflection prompts as starting points for discussion.
4. Discuss any follow-up actions students will take, including ways to track their influence on the problem or issue. Maybe they want to present their Geo-Inquiry Story to another person or share their video with other classes or display it on a school screen or channel.

Be sure to post your students' final Geo-Inquiry Story on your progress tracker under the Act phase. If you are using a wall to post progress, you can also display any other worksheets or documentation that represent this phase. Make it a big deal that the class has completed the Geo-Inquiry project. Celebrate!

GEO-INQUIRY PROCESS RESOURCES

Student Resources

- Self-Evaluation Form

APPENDIX

ASK — COLLECT — VISUALIZE — CREATE — ACT

VOCABULARY

action (noun) something that is done for a purpose
The action we took was getting recycle bins.

audience (noun) a group of people gathered to hear or see something
The people in the audience cheered after our speech.

call to action (phrase) asking people to take action
Our call to action was to clean up the schoolyard.

collaborate (verb) to work with a group on a project
The whole class collaborates on the Geo-Inquiry project.

community (noun) a group of people who are together in the same place
There are students, teachers, and workers in our school community.

data (noun) facts, numbers, and other pieces of information used to learn something
We counted birds. Our data showed 12 gray birds and 2 red birds.

direction (noun) where something or someone is moving or pointing
The teacher said, "Turn left here to get to the classroom." This is a direction.

event (noun) anything that happens; usually something important or special
Our Geo-Inquiry presentation was the biggest event of the year.

geography (noun) the study of landforms and bodies of water on Earth; places around us
We are learning about the geography around our school.

global (adjective) related to all of Earth
We are part of one big global family.

graph (noun) a drawing that uses dots, lines, etc. to show how much or how quickly something changes
She drew a graph that showed the temperature every day for a month.

inquiry (noun) a request for information
We made an inquiry to find out what time the museum opens.

interview (noun) a meeting at which people ask questions and get information
We asked the principal about recycling during the interview.

key (noun) a list of symbols on a map
We look at the map key to find the symbol for crosswalks.

VOCABULARY

line graph (noun) a drawing that uses a line to show how much or how quickly something changes
The line went up on the line graph to show how tall the plant grew.

location (noun) a specific place
We found a great location for a walk.

map (noun) a drawing of an area that shows things like mountains, rivers, roads, hallways, rooms, etc.
I am drawing a map that shows my school.

model (noun) a small copy of something
Our model of the town uses cereal boxes to show buildings.

multimedia (adjective) using several forms of communication, such as video, photos, and music
Our multimedia presentation was a video with music.

observation (noun) statement about something you noticed
Our observation about the playground was that it was clean.

pattern (noun) something that repeats in a regular way
The fence has a pattern of three blue boards then three white boards.

place (noun) a specific area or building
My favorite place in the schoolyard is the playground.

plan (noun) a set of actions meant to achieve something
Our plan is to collect data, make a model, and then draw a map.

poster (noun) a large paper or board with words and pictures that is hung up for people to see
We hung a poster about recycling in the cafeteria.

presentation (noun) an activity in which someone shows or explains something
Our presentation explained how to plant a tree.

proposal (noun) when you ask someone to think about an idea
Our proposal was to build a fence around the bird's nest.

role (noun) the job you do in a group of people
My role is to feed our class's pet hamster.

skit (noun) a short performance
We did a skit about school safety.

VOCABULARY

speech (noun) words spoken in front of people
He gave a speech about recycling.

survey (noun) an activity in which many people are asked the same question in order to find out what most people think
From our survey, we learned that most people want more shade trees.

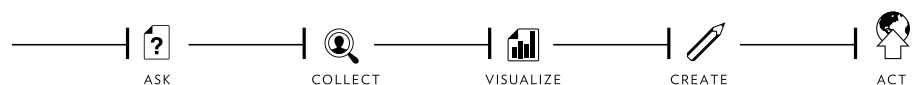**valid** (adjective) fair, reasonable, supported
We knew the information was valid because it was written by a scientist.

visuals (noun) something you look at
The visuals were pictures that showed garbage near the river.

world (noun) the planet where we all live
There are cities and towns all over the world.

CONTACTING COMMUNITY EXPERTS

Below is a sample script for a call.

Hello, my name is _____ and I am a _____-grader from _____ school. We are working on a project (<u>describe your project</u>). I am calling to see if you could help me (<u>describe what you need</u>). Is that something you could help me with or is there someone else I should speak to? Could we set up a time to speak about this? Thank you for your help.

Contacting Experts by Mail

Tips for contacting an expert by mail:

- Use the example format provided for your letter. Notice the spacing between key parts of the letter, such as the date and the address.
- Type your letter using a 12-point, easy to read font or write very clearly.
- Address your letter to a specific person. Use Mr., Mrs., or Ms., plus the person's last name. If you do not know the person's gender, use their full name instead.
- Proofread your letter before sending it and, if possible, have a peer proofread it too.
- Include a stamped envelope addressed to you at your school. This will make it easier for the expert to send you information.

Below is the format for a business letter.

Date	July 12, 2017
Your school address	My School 14 School Rd. Anytown, USA 12345
Address of the person you are writing to	Community Expert 36 Main Street Anytown, USA 12345
Greeting	Dear Community Expert,
Body of the letter	Introduce yourself, explain your project, and describe what you need. Ask if they could help you with this information. Thank them for their help.
Closing	Sincerely,
Signature	Your name (handwritten) Your Name (typed)

CONTACTING COMMUNITY EXPERTS, CONTINUED

Contacting Experts by Email

Tips for contacting an expert by email:

• Use the format below for your letter.

• Send the email from your school email address, not your personal email address.

• Use a subject that is short and specific, such as "Help with School Project" or "Information about Water Quality."

• Type your email using a 12-point, easy to read font.

• Address your letter to a specific person. Use Mr., Mrs., or Ms., plus the person's last name. If you do not know the person's gender, use their full name instead.

• Leave a blank line after the greeting, between each paragraph, and before the closing.

• Proofread your email before sending it, and if possible, have a peer proofread.

Below is the format for a business email.

Greeting	Dear Community Expert,
Body of the email	Introduce yourself, explain your project, and describe what you need.
	Ask if they could help you with this information.
	Thank them for their help.
Closing	Sincerely,
Signature	Your Name
	Your School

TAKING PHOTOGRAPHS AND VIDEO

As students collect data, be sure to take photographs and/or video. These visuals will be very helpful when students start assembling the Geo-Inquiry Story. You want to have a large selection to choose from so you can select high-quality images that support your data.

General Tips for Taking Photographs and Videos

1. Make sure you understand how to use any camera equipment before you go out into the field.
2. Check to be sure any batteries are charged, you have enough memory cards, and all equipment works before heading into the field.
3. Have a backup device and plan. Remember that you may not have another chance to get the photograph or video you need.
4. Take lots of photographs and/or video. It is always better to have more than you need rather than too few.
5. Never record or photograph anyone without their permission.
6. Always get a signed release from all people and locations in your photographs or video. The permission should clearly state you have their permission and can use the material in your Geo-Inquiry Story. Depending on the situation, you might want to ask for a release from everyone involved so you can capture photographs and video freely. If you are unable to get permission, film subjects without showing their faces or any other distingushing features—from the back, overhead, or maybe just their hands.
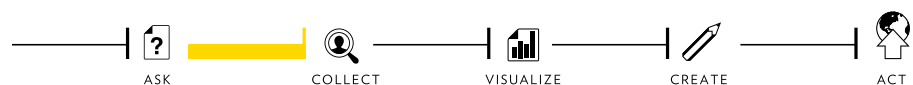
PHOTOGRAPHY: THE BASICS

After you read these tips, study images taken by professional photographs. Think about what you like and do not like about their work. If it fits into your project, imitate what you like and try to avoid what you did not.

1. **The Subject**
    *   **Get focused.** Make sure your subject is in focus. If you are using a smartphone, tap the screen where the object you want in focus is to sharpen that part of the photograph and then take the picture. Before you go into the field practice with these features to see what works best for your project.
    *   **Find your framing.** Ask yourself, "What is the focal point of this photograph?" Remember that it is okay to include other elements in the picture if they are part of the story. For example, suppose you are trying to save a historical building from being torn down and you interview a representative of the local historical society. You might photograph the interviewee in front of the building. In this example, you might want to capture both the person and the building.
    *   **Decide what orientation works best for the shot.** Does a horizontal photograph best capture the polluted river you are examining? Would a vertical image taken from a sitting position best capture the damage on the historical local library?
    *   **Move around your subject.** Try shooting your subject from different angles to find the best perspective and to frame out anything distracting in the background. Most people take a photograph of a person standing up, with the person centered in the middle of the image, but this is not very interesting. Move around your subject. Sit down on the ground and take an image from there. Step to your right or left. How does this change the background? This is also a quick and easy way to fix that tree that has suddenly sprouted from your subject's head. Rather than asking them to move, you move. This is especially useful if someone else is interviewing a city official or taking water samples. Try to avoid using the zoom feature on your equipment. Get in close or step back instead. This can be awkward and uncomfortable for both you and the subject, so make sure to get consent before entering their personal space.

2. **The Lighting**
    *   **Pay attention to lighting.** The light source (from the sun or other lights) should be directed on your subject. The best times to shoot photographs outdoors are early morning or late afternoon when the sun is low in the sky. These times are sometimes called the Magic or Golden Hour. The goal is for the subject to be evenly lit with few or no shadows.

3. **Composition**
    *   **The Rule of Thirds.** Placing the most important part of a picture dead center in the frame is usually not very appealing. Photographers use the Rule of Thirds to help with this issue. The Rule of Thirds breaks an image into nine smaller parts. It seeks to create a composition that strikes a balance between the strongest element and open areas, which will usually lead to a more successful image. In addition to the nine boxes, the Rule of Thirds creates four points where the lines intersect. Studies suggest these points are where people naturally look first. If you are using a smartphone or digital camera to capture images, you can turn on the gridlines feature in settings. These gridlines can help you stick to this rule without having to visualize the lines in your mind. So place the subject close to these intersects. Before you go into the field, practice this rule to determine what works best for you and your project.
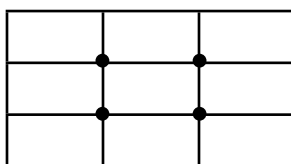
PHOTOGRAPHY: THE BASICS, CONTINUED

- **Background.** Focus on the edges and the background of the photograph. Try to get clean and uncluttered edges of your frame and backgrounds. The biggest mistake we make in photography is to just frame our subjects in our photograph without considering the background. Avoid busy backgrounds, photobombing, trees or flagpoles sticking out of your subjects' heads, white bags, white cars, or telephone poles, unless they are part of your story.
- **Leading lines.** Connect points in a photograph and guide the viewer's eye from one point to another. Most often, these lines guide the eye from the foreground to the background. An example of this would be a road that starts in the front of the image and draws the viewer in until it vanishes into the horizon.
- **Details.** See the beauty in the details. Close-ups of faces, colors, textures, and patterns give added dimension and details to your photographs. When photographing people focus on their eyes to make a memorable shot.
- **Emotion.** Photograph something that brings out an emotional response in you and your viewer. Generally, people like faces in photographs, but side shots can help lead people to the subject of the photograph. Faces show emotions, so pay particular attention to eyes and mouths.
- **Photo editing.** Generally, National Geographic does not edit photographs so the reader gets a truthful and honest picture. Planning your shots in advance can help you follow this method of reporting.

VIDEOGRAPHY: THE BASICS

1. **The Shots**
   - **Know your audience.** Who will watch the video? How students explain the topic to peers is different than how they would explain it to the city council or the principal. Students likely know more about the topic than they do. Do not assume that they know all of the jargon.
   - **Shoot horizontally.** The screens on most video viewing platforms are horizontal, so hold your camera horizontally when shooting. When shooting a selfie, look back into the camera lens and not at the screen. This makes your viewer feel like you are talking to them.
   - **Choose your frame.** Think of each video shot like a still photograph. Do you want to highlight a landscape or an individual subject? What is in the background? Make sure your subject is visible, and try to frame out distractions.
   - **Stability.** Hold your camera still and allow the movement to come from your subject, not your camera. Use a tripod. If you cannot use a tripod, hold the camera in both hands and brace your elbows against your rib cage.
   - **Capture the whole Geo-Inquiry Story.** Film each step of the Geo-Inquiry Story—thoughts before students start, key moments during the process, and reactions once students have finished.
   - **Shoot a variety of angles.** Get wide shots of the location, close-ups of actions, and reactions from students. Get creative by filming from unique perspectives, but always be sure to get a master shot (a wide shot of the action unfolding) before moving on to other angles. You can also get one of the group members to film another angle and then choose which works best for the Geo-Inquiry Story when you are editing.
   - **Follow the action.** Video is about action! Always focus on capturing what is happening and what the subjects are doing, for example, students taking samples or an animal in motion. Seeing something happening in the moment is much more interesting than hearing someone describe it afterwards.

2. **Technically Speaking**
   - **Pay attention to lighting.** The time of day, weather, and location all influence how your video looks. Color and light are especially beautiful during "golden hour" and "blue hour" before sunrise and after sunset. Remember to direct the light source (from the sun or other lights) on your subject.
   - **Record quality audio.** Aim your microphone, either external or on-camera, towards the speaker's mouth. When doing an interview, always choose the quietest possible location. If you can hear background noise, you should also see it. If there is noise from traffic or a waterfall, be sure to include that visual in your shot. If you are shooting with a smartphone, consider plugging in a pair of headphones with a microphone; just be sure to keep the wires out of your shot. This can improve audio in some cases. Before you go into the field, practice recording video with students so you are very comfortable with your tools in the field.
   - **Hold the shot.** Be sure to start recording three seconds before the action starts, and stop recording three seconds after the action ends. You will be grateful when you have to edit the clips! Inform all of the video participants prior to filming that you will need them to remain quiet for a few seconds after you hit record.

VIDEOGRAPHY: THE BASICS, CONTINUED

3. **Preparation**
   - **Permission.** Before recording, make sure you have permission from the site. You also need permission from any people you plan to record. If possible, visit the location the day before or arrive early to scout out the best place to shoot. A good location is safe, has good lighting, an appropriate background, and multiple vantage points from which to film. Even after you have a plan, be flexible. You may find other interesting possibilities on the day of the shoot.
   - **Be prepared.** Have your equipment charged and ready to use. Pack the charging cable in case you need to plug in your camera. If it is possible, bring extra equipment or record with multiple devices in case you experience technical difficulties. If you are outside, be prepared for the weather. Check the forecast and have a backup plan for what to do if you cannot film or need to change locations.
   - **Let it roll.** Take more video than you think you need. You do not need to use all of what you record, but it may not be possible to go back and film again if you do not have enough material.

4. **Editing**
   - **Simplify.** Concentrate on being brief. Focus on the most essential components needed to tell the Geo-Inquiry Story.
   - **Accessibility to audience.** Use language that will reach more people and avoid jargon. This should include the use of analogies and metaphors when describing complex concepts.
   - **Make them care.** Use images, angles, and event cuts to create emotion.
   - **Scene changes.** Avoid "jumps" when you are editing scenes together. This occurs when you have two consecutive shots with the same camera set up but with different subjects. Also avoid "cuts in motion." Instead, cut from one scene to another when a subject is in motion such as turning his or her head or opening a door. You can also use a technique called a "wipe," which is when someone or something walks in front of the camera; it helps make a natural cut to a new scene.
   - **Interviews.** When doing longer interviews it is good to change angles from a wide shot to a medium shot or close-up. However, using zoom should be avoided, as it is distracting to the audience.
   - **Angles.** When using multiple shots, always try to change to a new angle with each new shot. This will prevent it from appearing as a "jump" or "bump."
   - **Substance rather than form.** Remember, you are telling a Geo-Inquiry Story, not showing fancy techniques. The Geo-Inquiry Story should drive the video editing. Ask questions such as: *How is this adding to the Geo-Inquiry Story? What does this element add to the Geo-Inquiry Story? Are there Need-to-Knows that need to be answered that are not in the video?*

PHOTOGRAPH AND VIDEO RELEASE

I _____ give permission to be photographed, videotaped, and/or audio taped by
(subject's name)

_____ at _____ on _____. I understand that this material may be used
(name of photographer/videographer)   (location)   (date)

for any purpose including, but not limited to, use in publications, websites, video and audio productions, promotional materials, or

other media.

Signature: _____

Signature of Guardian if under 18: _____

DEVELOPING A SURVEY

Surveys are a good way to gather information from a lot of people relatively quickly. Surveys ask people a question or series of questions about themselves or for their opinions.

Identifying the Purpose of the Survey

The first step in creating a good survey is simple: know the purpose. Understanding why students are doing a survey will help determine what kind of questions to ask and whom students should ask (the respondents). For example, if the purpose of the survey is to find out what the teachers would like to do on teacher appreciation day, then do not survey students.

Types of Survey Questions

There are two main types of survey questions: open-ended and closed-ended.

1. **Open-ended questions** allow respondents to write in their own answer. These questions result in qualitative data. Example: *What suggestions do you have for ways we can improve our service?*

   Advantages to open-ended questions
   • Respondents can provide answers that might be surprising.
   • Respondents provide more details or information than you would get from a close-ended response.
   • Respondents can make their response more clear and specific, particularly if their answer does not exactly fit the choices you might give.

   Disadvantages to open-ended questions
   • Open-ended questions are more difficult to tally, since every respondent could give a completely different answer. So, if you want numeric data that students can graph or tally, open-ended questions are probably not the best choice.
   • Open-ended questions usually take longer to answer than closed-ended questions.
   • For younger students, you will need to conduct a lesson or discussion in order to analyze open-ended question data.

2. **Closed-ended questions** force respondents to choose from a set of options. Yes/No questions, multiple choice questions, and rating scales are all types of closed-ended questions. Closed-ended questions result in quantitative data (data that can be easily counted or measured).

   Example: What color is your cat?
   A. Black   D. Orange
   B. White   E. Combination
   C. Grey

Avoid bias

   Sometimes the way you write a question can accidentally affect the way people answer that question. Your wording can make them feel more positively or negatively about the topic. Influencing responses in this way is called bias. For example, if you include the question "Are the oak trees in your yard healthier than the ash trees?" people might rate the oak trees as healthier than they would have if you used the question "Which are the healthiest trees in your yard? (A) oak trees or (B) ash trees."

DEVELOPING A SURVEY, CONTINUED

Surveys should be as objective, or neutral, as possible. It is very important to try not to bias the survey in any way. When you are writing your questions, try not to have a preferred answer in mind. Always check your language to look for words that might influence how a respondent answers the question.

Test it out

Ask one of your colleagues to complete your survey to test out before you use it. Your tester can let you know if any of the questions are confusing. They can point out any bias they notice in the survey. They can also give you feedback on how long it took them to complete the survey and on how the survey was conducted.

For this age group, a written survey is best. Online and phone surveys will not give new learners a concrete idea of what it is to survey or poll people. You can type the survey questions and answer choices and print them out for people to answer and return.

Advantages to written surveys

- Respondents can take their time with the survey and not feel rushed.
- You can reach people who may not have access to the Internet.

Disadvantages to written surveys

- Responses will need to be hand-tallied.
- If you are using open-ended questions, respondents' handwriting may be difficult to read.
- You will need to have a way to get the survey to and from respondents. This might be easy if students are surveying classmates, but more difficult if they are surveying strangers. Many of the surveys may not be returned.

Advantages to closed-ended questions

- Respondents can answer the questions relatively quickly.
- Answers can be easily counted and visually represented.

Disadvantages to closed-ended questions

- Respondents might have to choose from answers that are not quite what they want to say *(What if you have a purple cat?)*.
- Researchers may miss out on less obvious responses and additional information that might help them better understand the topic.

Surveys can have a mixture of both question types. For example, you might have some multiple-choice answers and rating scales followed by an open-ended answer where respondents can explain their choices. Combining question types can enable the researcher to collect both quantitative and qualitative data.

DEVELOPING A SURVEY, CONTINUED

Tips for Writing Good Survey Questions

Keep it simple

Use the simplest language possible. Use multiple, smaller sentences rather than long, complicated ones.

Give context

If students are going to ask about something that may be unfamiliar to the respondents, include any information they may need to know in the question itself. For example, if they are going to ask a question about microplastics in water sources they will probably need to define microplastics as tiny pieces of plastics—the size of sand or smaller.

One thing at a time

Each question should focus in on only one thing. Including more than one idea in the same question can be confusing. It can also make it more difficult for respondents to give an accurate response. For example, if you asked: "Rate paper waste and plastic waste on a scale of 1 to 10," respondents might have trouble answering that question if they saw plastic waste but no paper waste. Instead you might ask two separate questions: "Rate the paper waste in the cafeteria," and "Rate the plastic waste in the cafeteria."

GEO-INQUIRY STORYBOARD: PRESENTATION

Use the guide below to plan your Geo-Inquiry Story.

Geo-Story Title _____

Scene _____

Description
_____
_____
_____

Text or Narration
_____
_____
_____

Audio (music, sound effects)
_____
_____
_____

Video or Image
_____
_____
_____

Length
_____

Transition
_____
_____
_____

Other
_____
_____
_____

TRACKING GEO-INQUIRY STORY ELEMENTS

Use the charts below to track which photographs, videos, graphics, and text have been created and edited and to whom they are assigned.

Photographs

List all photographs you will use in the Geo-Inquiry Story. If you already have the photograph, include its file name. If you do not have it, include the specs for creating it.

Scene #	Photograph Description	Specs (size, orientation)	Shot?	Edited?	File Name	Assigned to?

TRACKING GEO-INQUIRY STORY ELEMENTS

Videos

List all videos you will use in the Geo-Inquiry Story. If you already have the video, include its file name. If you do not have it, list the specs for creating it.

Scene #	Video Description	Specs (orientation, length)	Shot?	Edited?	File Name	Assigned to?

TRACKING GEO-INQUIRY STORY ELEMENTS

Graphics

List all graphics (maps, charts, graphs, etc.) you will use in the Geo-Inquiry Story. If you already have the graphic, include its file name. If you do not have it, list the specs for creating it separately underneath the chart.

Scene #	Type of Graphic	Specs (orientation, colors, what should be included)	Created?	Edited?	File Name	Assigned to?

TRACKING GEO-INQUIRY STORY ELEMENTS

Text

List all text and narration you will use in the Geo-Inquiry Story. If you already have the text, include its file name. If you do not have it, list the specs for creating it separately underneath the chart.

Scene #	Text Written?	Edited?	Narration Recorded?	Edited?	File Name	Assigned to?

GEO-INQUIRY STORYBOARD: SKIT

Scene _____

Actors and Roles
_____
_____
_____

Description
_____
_____
_____

Lines
_____
_____
_____

Audio (music, sound effects)
_____
_____
_____

Props
_____
_____
_____

Length
_____

Transition
_____
_____
_____

CREDITS