CHAPTER 5

Cognitive Constructivism

Discovery Learning (Inquiry and Problem Solving)

Learning Outcomes

Today, many feel that teaching and learning social studies are more effective when students reconstruct their current knowledge. In this view, called *constructivism*, which has various forms, learning is considered not just a course of taking in and storing information but a process used to reflect on past experiences and create a personal understanding of the world. After completing this chapter, you will be able to:

- Define the nature and instructional implications of cognitive constructivism.
- Describe how to incorporate cognitive constructivist teaching methods, strategies, and tools into a social studies program.
- Discuss the differences and similarities among the different models of inquiry and problem solving.
- Design and utilize appropriate inquiry and problem-solving strategies.
- Analyze the effectiveness of inquiry and problem solving strategies and their impact on learners.

What Does a Cognitive Constructivist Classroom Look Like?

Students in Jennifer Stewart's fifth-grade social studies class have spent the past week learning about unique customs of diverse cultures around the world. Today, their attention is focused on various cultural greetings. The students talked freely about the unique ways people from diverse cultures greet one another.

Sean suggested, "In Japan, it's polite for men and women to bow when they greet someone. But the Japanese now use the handshake, too."

Christine focused on the formal Muslim greeting from the past—keeping the palm of one's hand open and touching the breast, forehead, and lips, signifying endearment in heart, thoughts, and words. "It was like saying, 'You are in my heart and my mind,'" explained Tara.

"People from Italy sometimes greet friends by kissing on both cheeks," added Patrick.

"My family is from India," volunteered Tanya. "We use a greeting called *Namaste*. You press both palms together in front of your heart. Then you bow your head."

"I'm a Boy Scout," said Warren. "We shake left-handed—the hand nearest the heart."

The most important questions in Ms. Stewart's classroom are those asked by students as they try to make sense of interesting topics; one absorbing question emerged when some students began to describe and demonstrate the handshaking styles of present-day athletes. Their main questions were: "Where did these handshake routines come from?" and "What do they all mean?" Ms. Stewart is convinced that children have a natural tendency to seek information whenever they are confused or curious about something, so she is always receptive to their inquiries: "That's a splendid question, Sofia, and it has a number of possible answers. Let's talk about some possible ways to approach this problem." Ms. Stewart knows that curiosity is the heart of inquiry and realizes that she has a significant responsibility in helping her students seek answers to and gain meaning from their questions.

Some students searched the Web and other computer resources. Others looked through pertinent books and magazines. A few students interviewed siblings, parents, teachers, and other adults. Their investigation uncovered some fascinating information, although the students found that, although the modern "shaking" variations of today's athletes are rooted in African-American culture, the evidence was inconclusive: Basketball player Magic Johnson claimed to have originated the "high five" at Michigan State in 1980, but long jumper Ralph Boston argued that the "slap five" began among African-American track athletes on the international track circuit prior to 1968. Some insist that revolutionary handshakes started as far back as the 1940s, when African-American musicians greeted each other with a special shake accompanied by the jive phrase "Gimme a little skin, man." Regardless of the origin of the handshakes, Ms. Stewart's students became convinced that these handshakes were not just a passing trend. They pointed out that some sports teams have a pregame hand shaking routine that is more carefully orchestrated than a classical ballet.

"They're not just a fad," argues Darius. "I've high-fived a million times! No contest."

"People will keep inventing new handshakes forever," added Lillian in support.

"I agree," said Nicole. "But by the time you learn all the handshakes, the season is over!"

Ms. Stewart supported the efforts of her students throughout this thought-provoking classroom episode because she believes that the most worthwhile social studies learning takes place when children work at what *they* want to know. Her viewpoint is based on a belief that elementary school students are naturally inclined to dive headlong into whatever excites their interests, and social studies teachers should be a little more flexible, a little more spontaneous, and a little more willing to help children investigate their social world. Certainly, in her balanced approach to instruction, there are times when Ms. Stewart directs her students to read for specific purposes from their social studies textbook or points out what to watch and listen for as she explains something through explicit instruction. However, Ms. Stewart knows it is crucial to also provide many opportunities where the focus of activity shifts away from the teacher to the students.

NCSS STANDARDS

This activity aligns with NCSS standards:

- **I.** *Culture*
- **III.** *People, Places, and Environments*
- **IX.** *Global Connections*

Leila Christenbury (2010/2011) is a strong advocate of Ms. Stewart's viewpoint on instruction. She claims that although there is no fixed formula, no precise recipe, to ensure effective teaching, we can recognize effective teaching by a number of characteristics, each of which involves a degree of flexibility:

- ***Effective teaching is variable.*** Effective teachers use a variety of strategies and a range of methods. Good teaching comes not from following a recipe but from putting student needs first.
- ***Effective teaching is contextual.*** Effective teachers alter, adjust, and change their instruction based on the unique characteristics of their students and the extent to which their students are achieving targeted standards.
- ***Effective teaching is premised on students' intellectual curiosity.*** Effective teachers begin with the belief that students love to learn and benefit from the challenge of learning.
- ***Effective teaching must be somewhat autonomous.*** Effective teachers must be empowered to use their judgment to make instructional decisions; they need not be overly managed and controlled.
- ***Ultimately, effective teaching is fearless.*** Effective teachers prioritize student needs rather than the strictly interpreted demands of the school district curriculum guide or the year-end test. To do this, they must have a great deal of inner strength and confidence.

To meet her district's standards, Ms. Stewart initiated the study of unique customs as a guided instructional sequence, as described in Chapter 4. However, she soon realized that a powerful instructional conversation had touched off an unanticipated spark; her students had acquired a passion for and made an emotional commitment to an idea that had captured their attention and curiosity. Realizing that genuine interest like this does not flare up every day (or week), Ms. Stewart was faced with a puzzling dilemma: "Should I capitalize on their glowing curiosity and support my students as they pursue their interest or leave it alone and return to the lesson plan I wrote yesterday?" Obviously, Ms. Stewart chose to grasp the moment and spur purposeful action on the part of the students; she concluded that pulling the plug on her prepared lesson plan was a small price to pay for a first-rate learning experience. Because she takes a flexible teaching approach, Ms. Stewart either waits for or provides something meaty for the children to sink their teeth into. She does not always rely on the teacher's manual to know what to do next; she goes to where the action is. Only one thing matters to Ms. Stewart: being tuned into and encouraging the curiosities of her students.

That strong inner drive to unlock the curiosities of their world is clearly exemplified by the comment I once overheard Miles, a second-grader, make after his teacher asked the class, "What would it be like to know *everything*?"

"Awful!" Miles exclaimed without hesitation.

"Awful?" probed the teacher in disbelief. "Why do you think that knowing *everything* would be awful?"

"'Cause then there'd be nothin' left to wonder 'bout!" countered Miles.

Rachel Carson (1965) believed that the innate sense of wonder displayed by Miles was an exciting and fresh part of every child's life: "A child's world is

Curiosity is a basic childhood trait—an intense desire to know and find out. Do children best find answers by inquiring into their questions or by obtaining answers from others?

fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood" (p. 42). Carson believed that to keep from losing this inborn sense of wonder, children must have the support and encouragement of adults who can both nurture and share the mystery and excitement of the world; teachers must keep the children's and their own sense of wonder alive. "If teachers are reluctant to wonder, will they ever keep curiosity alive in their students?" Ms. Stewart asks. "It is the job of social studies teachers to arouse, not suppress, the natural wonder their students carry to school." In that single persuasive statement, Ms. Stewart summed up the beliefs of those who contend that social studies education must keep the spark of wonder burning in our children's lives.

What Is Discovery Learning?

Curiosity breeds a genuine need to know, but simply being curious about something does not, in itself, guarantee understanding. Understanding emerges when active, curious minds search for and come up with clear-cut answers or solutions. How are students able to do that? Cognitive constructivists believe that solid understandings are best brought about when children discover information for themselves. *Discovery learning*, an inquiry-based, problem centered, constructivist learning approach, goes back at least as far as the writings of Rousseau and Pestalozzi, but it has experienced a rebirth in recent years, especially because many consider it to be the most effective vehicle for promoting 21st century student outcomes. Jerome Bruner (1961), a constructivist and "founding father" of contemporary discovery learning, wrote: "Mastery of the fundamental ideas of a field involves not only the grasping of general principles, but also the development of an attitude toward learning and inquiry, toward guessing and hunches, toward the possibility of solving problems on one's own" (p. 20). Bruner's writings suggest that the major goals of discovery learning can best be addressed through two student-centered instructional approaches: inquiry and problem solving.

Although they are quite dissimilar in form and function, the terms *inquiry* and *problem solving* are often used interchangeably. To distinguish between the two, however, think of *inquiry* as an instructional process that mirrors how social scientists study our world—by posing, investigating, and answering questions. The overall goal of their inquiry is to come up with rational (logical) answers to questions *asked in order to get specific information in reply*—for example, "What important geographic factors influenced the development of the ancient River Valley civilizations?" The term *problem solving*, on the other hand, has been used to cover a number of things we do in social studies, from fitting together puzzle pieces to creating solutions to poverty and pollution. One of my favorite definitions of problem solving, however, came from a speaker who once

said, "It's what you do when you don't know what to do!" Problem solving is a process we employ when facing a problem, *an uncertainty or difficulty requiring a creative or unique solution*: for example, "If you were making recommendations to your school principal to address bullying, what would be the three most important actions you would suggest?" To solve the problem, you *must generate several novel but useful solutions*, eventually selecting the most plausible alternative(s). We confront problem solving situations, then, by generating a number of creative, original solutions, but we resolve inquiry questions with rational or logical answers.

Inquiry-Based Learning

Inquiry-based learning and teaching are powerful approaches designed to engage students in meaningful investigative processes. Inquiry is found in many forms, but all inquiry-based instruction is based on the belief that students actively construct meaning and that process skills transcend any specific subject matter acquired from a learning experience. A push to incorporate inquiry into the elementary school social studies classroom has its roots in John Dewey's classic book, *Democracy in Education* (1916), in which he describes how real learning is activated by the curiosity of students. Dewey claimed that the essentials of learning were contained in the scientific method and that inquiry used in the elementary school classroom should be much the same as that used by social scientists—asking questions, investigating solutions, creating new knowledge, discussing findings, and reflecting on what was learned. For all practical purposes, Dewey portrayed elementary school students as *mini-social scientists*. Mini-social scientists make their own discoveries. By no means will they be expected to reinvent the wheel or dream up something new to humanity, but when engaged in inquiry, students dig up information that is new to them. Despite the fact that their investigative processes are not as precise as in the world of the professional social scientist, both share a thirst to poke, prod, inspect, inquire, discover, and explore all the wonders of our world.

Descriptions of the actions needed to achieve Dewey's inquiry method vary from source to source, but all are based on this time-honored pattern (Dewey, 1916):

1. The students identify a problem or question that can be investigated.
2. The students generate hypotheses, or tentative answers that can be verified.
3. The students collect data.
4. The students analyze the data and form generalizations that can be applied to this problem and to similar ones encountered in their lives.
5. The students share their results with an audience.

Do you remember learning about or using inquiry in elementary school, middle school, or high school? People who do often tell me that they were left with the impression that social scientists never deal with a problem until they put on their horn-rimmed glasses, grab their clipboards, sharpen their no. 2 pencils, and carefully check off each step of the inquiry process as it is completed. Perhaps they developed these perceptions because inquiry tends to be taught in many classrooms as a series of linear steps, such as Dewey's- a fixed, step-by-step chain of action. In the real world, however, this rarely happens. *Sometimes* students will employ the pattern as sequenced above, *sometimes* they will use more than one step at a time, *sometimes* they will mix up the order, and *sometimes* they will ignore the steps altogether while grubbing around and prying for answers. *Sometimes* adult social scientists follow the scientific method to the letter, too, but more often they work in a slightly more informal manner. They have found that there is no single way to explore all questions, so they use a variety of approaches, techniques, and processes in their work. Does a flexible, unsystematic approach remind you of the way children tackle problems, too? It is. Children, by their very nature, are curious about their world and love to dig in, explore, and investigate until they resolve their "mysteries of the mind"—sometimes unsystematically and sometimes in a more organized manner, just like certified social scientists.

Think of Dewey's pattern not as a "set in stone" sequence of responsibilities but as a broad and flexible set of investigative strategies that help students resolve their curiosities about our social world. Regardless of its form, inquiry has received growing recognition as an important learning strategy in social studies. For example, the influential publication *National Curriculum Standards for Social Studies* (NCSS, 2010) pinpointed the central role of inquiry in the development of good citizens:

> *The aim of social studies is the promotion of civic competence. . . . NCSS has long recognized the importance of educating students who are committed to the ideas and values of democracy. Civic competence rests on this commitment to democratic values, and requires the abilities to use knowledge about one's community, nation, and world; apply inquiry processes; and employ skills of data collection and analysis, collaboration, decision-making, and problem-solving [italics added].* (p. 9)

The Core of Inquiry-Based Learning

Although children possess strong natural curiosities, some teachers are concerned that the youngest elementary school children (up to second grade) are not quite capable of the kind of thinking required to carry out authentic investigations; limitations in reasoning affect the kinds of inquiry they can perform. Piaget has described the thinking of these preoperational-stage youngsters (ages 2–7 years) as marked by fascinating errors in logic; their thought is dominated more by perception than by logic. They look outside, for example, and see a flat world. They may have heard from adults or television that Earth is round, so, when asked, they often say, "Yes, Earth is round." But their minds picture the

roundness of a pancake rather than the sphere perceived by adults. So, the children's thinking is at a point where they struggle with the basic shape of Earth, yet we insist on teaching them about the solar system!

Does it help to tell them what they need to know? Not much. Preoperational children are quite *egocentric*; they experience great difficulty understanding our world from any perspective other than their own. Egocentric children believe that everyone thinks as they do and that everyone shares their views, feelings, and desires. Critics point out the stark contrast between the reasoning employed by professional social scientists and that routinely used by young children: Children often distort evidence to preserve their egocentric or magical thought or make systematic errors in the interpretation of evidence.

So young children differ from professional social scientists not in their willingness to ask questions but in their developmental ability to locate and assess the quality of their answers. To help young children move toward the construction of more accurate understandings than they can make on their own, we must create classroom opportunities that help children explore phenomena and materials much as they would do on their own, but enriched by providing focus and structure to what is going on. Children's first experiences with classroom inquiry, then, should serve as a bridge between their free, natural childhood explorations and the acquisition of an interconnected set of organized processes and skills that children will need as they question, explore, and investigate their social world. Teachers must provide children with new experiences that challenge their existing ideas and help build new concepts. Then, as children grow through the upper-elementary grades, they will progress from giving the fantastic or grandiose explanations of their early years to using more mature actions, such as processing their own ideas, proposing hypotheses, rethinking their ideas, and coming up with sound conclusions.

In order to prepare your students for inquiry, you must spend a substantial amount of time helping them develop the prerequisite skills—scaffolding the processes they will use while doing inquiry. Through a variety of activities, students must practice their observing and questioning skills, describing skills, and record-keeping skills. Observation begins the inquiry process and continues throughout all its phases; observation generates questions and questions create a desire to search for answers. Once these prerequisite inquiry skills have been put in place, they can be gradually integrated into social studies units, as students observe closely and ask questions within the context of selected concepts or skills. As they continue to progress and see how their discoveries and observations help build conceptual understandings, students will eventually develop the ability, desire, and confidence to pursue their own curiosities and interests.

Foundational Inquiry Skills

The first step in helping children acquire prerequisite inquiry skills is to provide observational experiences with fascinating hands-on materials. The younger the

child, the longer the time needed for the hands-on exploration. Classroom displays, or what I like to call "mini-museums" when they are arranged for social studies purposes (others have variously called them *interest areas*, *curiosity centers*, and *theme tables*), are essentially exhibit areas designed to encourage children to explore, question, think, and talk. Today's exhibit might be origami, a Chilean rain stick, foreign coins, a butter churn, a powder horn, shark's teeth, campaign buttons, tape recording of city sounds, or a sombrero. Whatever you select for the mini-museum should be treated like an exhibit in the best public children's museums—not with a "hands-off" rule but with a policy that invites touching, exploration, and investigation.

To begin, take your students to a local museum so they can get a good idea of how exhibits are put together. A museum educator can lead a gallery tour and explain how objects are displayed in the exhibitions. Observing exhibit designers laying out an exhibition can be especially helpful if you plan to involve the students in designing and putting together the classroom exhibit area.

A class field trip to a museum can spark intense student interest, but practical concerns, such as money and time, limit the possibilities of a visit. An alternative to real-life field trips is online virtual museums (websites that post image galleries and information). Obviously, nothing replaces the actual experience of a museum tour, yet experiencing a high-quality online museum helps integrate technology and inquiry into social studies classrooms. The Smithsonian Institution (http://www.mnh.si.edu/panoramas/) and Colonial Williamsburg (http://www.history.org/history/museums/online_exhibits.cfm) are two excellent online sites to visit with your class.

Back in the classroom, review what a museum is—a place where interesting objects are displayed; most often, the objects are of historic or cultural significance. Lead a class conversation by offering prompts such as: "What exhibit do you remember most?" "Why do you think that particular exhibit stands out in your mind?" "How might objects be exhibited in a classroom museum?" "What would you call the classroom museum?" Even upper-grade and middle school students enjoy designing exhibits and sharing interesting collections of objects.

Explain that research is an important part of a museum exhibition area. Curators must study the objects in their care so they can provide visitors with accurate information—where, when, and by whom it was used as well where it was found and who made it.

Todd Lewis, a second-grade teacher, modeled the curator's research responsibilities by placing a seemingly odd object on a table—a cornhusk doll. On the wall above the table was a sign that read "Classroom Museum."

"I've brought something interesting to our classroom museum today," he told the children. "Look at it carefully, and we'll talk about what you see." Almost instantly, the children began looking at the doll, touching it, and talking about

what it might be. Mr. Lewis watched and listened, occasionally asking open-ended questions and making comments to stimulate the children to think more about the object. Jaime suggested that it looked like a like a toy—"from olden times . . . a doll, maybe?"

Mr. Lewis inquired, "What makes you think it's a doll, Jaime?"

"It looks like it has arms and legs and a body. It doesn't have a face, but the top looks like it might be a head," replied Jaime.

"I agree, it is shaped like a doll, Jaime," continued Mr. Lewis. "What do you notice, Rita?"

"It looks like a doll, but I think it might be made out of corn plants," suggested Rita. "It looks like the dried corn plants we put out at Halloween. I never, ever saw a doll made from corn leaves, though."

"You're right; that doll was made from part of a corn plant, Rita," affirmed Mr. Lewis. "It's made from the part of called the *husk*. Here, look at this. It is a cornhusk before it was made into a doll."

"How do people make dolls out of cornhusks?" the children asked spontaneously.

Mr. Lewis took a few minutes to demonstrate how to make a cornhusk doll. (He found the directions at http://www.teachersfirst.com/lessons/nativecrafts/cornhusk.cfm.) Mr. Lewis asked the children to follow his lead to make their own. The craft activity continued for several minutes.

Mr. Lewis emphasized the importance of checking other sources, too, calling the children's attention to the classroom computer station, where he used a kid-safe directory to hand-pick several websites that provided appropriate information about cornhusk dolls. "What does the doll tell you about the people who used it?" he asked after the children explored the sites.

During their instructional conversation, the children brought out some very interesting information: Cornhusk dolls have been made by American Indians for hundreds of years; brittle dried cornhusks become soft if soaked in water; they were used to produce other children's toys, too; some cornhusk dolls were used in sacred ceremonies; and children in the American colonies often learned how to make toys from the American Indian children who lived nearby.

Mr. Lewis recorded each piece of information on a large wall chart. "We must keep careful records of everything we discover so we can share our findings with other people. We can do that by using a special 'museum fact chart.' The chart says, 'What I Know About,' but it's followed by a long blank. What words should I put in the blank?"

"Cornhusk dolls!" shouted most children in unison.

Mr. Lewis continued, "That's a wonderful suggestion. What are some things we might write about this cornhusk doll?"

Denise suggested, "American Indian children made them from corn husks." Other suggestions kept coming forth for several minutes until the chart was completed.

Mr. Lewis planned to display something new that would be directly tied in to the social studies topic under study in the mini-museum every few days. The children were told that they would be using their skills of observing and investigating to uncover relevant information.

As important as they are, observational experiences by themselves do not guarantee the acquisition of inquiry skills. Mr. Lewis also used carefully worded probes and prompts to help the children unlock meaning from the mysteries that confronted them:

NCSS STANDARDS

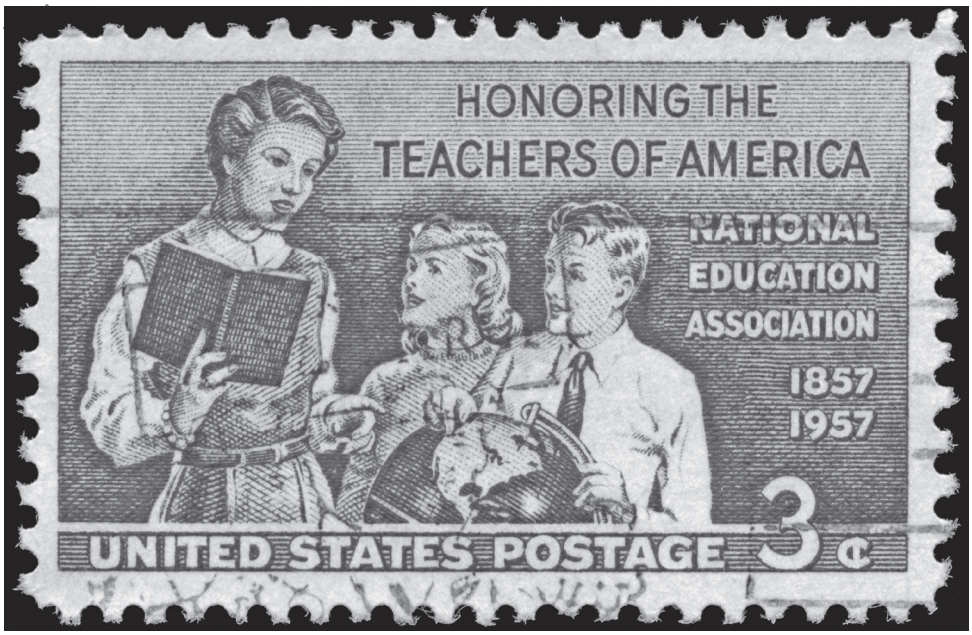
This activity aligns with NCSS standards:

- **I.** *Culture*
- **II.** *Time, Continuity, and Change*

- "What do you see here?"
- "How do you suppose it is used?"
- "I wonder what would happen if . . . ?"
- "If we try it again, do you think the same thing will happen?"
- "Is this like anything you've ever (used, seen, tried out) before?"
- "How can we find out more about . . . ?"
- "Can we find out if we watch it carefully?"
- "What makes you think so?"
- "Who do you think might use this?"
- "Where do they live? What makes you think so?"
- "What can you tell about the people who use this?"
- "What do you think of the people who use this?"

Some of these questions and comments help children look for specific things; others are more open and encourage higher thought processes, such as predicting and discovering relationships. Through such thought-provoking observational experiences, you are able to model the basic questioning and research skills required for sophisticated scientific investigations. In that light, in addition to asking good questions, you must encourage your children to ask questions, too. Do not be concerned if you are not able to answer some of their questions; no one has *all* the answers. The most important thing is that your students know it is okay to ask questions and to look at things in new ways. Knowing that you are willing to listen will help your students gain confidence in their own thinking and encourage further interest in social studies content. And listening to what they say will help them understand that you care—an important emotional component that will encourage students to figure out what they know and how they know it. In an inquiry-oriented classroom, questions may be posed by the teacher *or* presented by the children. Regardless of the curiosity source, the defining characteristic of inquiry is not only that a question has been asked but that the children are also directly involved in *researching answers*.

What questions might a social studies teacher use to focus and prompt discussion and analysis of this vintage postage stamp located at today's classroom display?



Approaches to Inquiry

Inquiry-based instruction can be quite varied; the general approach can be thought of as a continuum: *open inquiry* (informal), *guided inquiry* (semiformal), and *structured inquiry* (formal). *Open inquiry*, as the name implies, most resembles the spontaneous exploration that is fueled by childhood wonder and curiosity. Students develop their own questions or problems and plan and carry out all phases of investigation. Self-determination, active participation, and peer collaboration embody the classroom climate. Teachers facilitate the process, often by furnishing materials for the students or by taking on the role of co-learner. *Structured inquiry* is more systematic; application of the scientific method is required to complete the investigation. Teachers prompt and guide throughout the investigation, providing students the structure and support necessary to be successful throughout the inquiry process. Because these two types of inquiry are often positioned at opposite points of an inquiry continuum, multiple variations of teacher-led to student-led alternatives are possible. For example, many educators use *guided inquiry*, which could be located at about the middle of the inquiry continuum. In guided inquiry, the teacher poses a question or problem and provides the students

FIGURE 5.1 A Continuum of Classroom Inquiry, from Open to Structured

Open Inquiry	Guided Inquiry	Structured Inquiry
The students generate their own questions and design their own investigative procedures.	The teacher poses a question and provides the students with research materials. The students determine the process for their investigation.	The question comes from either the teacher or students. The students must follow the steps of the scientific method.

with materials for their investigation. However, the students themselves take on the responsibility for designing and carrying out the investigational procedures. The inquiry scale shown in Figure 5.1 should be thought of as a continuum, so ideally students should progress gradually from open to structured levels over the course of a school year.

Although these three descriptions summarize the general types of classroom inquiry, the chances of observing either exactly as described in this chapter would be rather slim. That is because there are most likely as many permutations of inquiry as there are teachers. As with general instructional strategies, the general consensus among social studies educators is that any form of inquiry (structured, guided, or open) can be useful to students when taught appropriately and well.

If you are making a transition from a teacher-directed, traditional classroom to inquiry instruction, you must be sure that your student-centered emphasis does not run against the grain of the classroom practices that students find most familiar. There must be a transition period during which students change over from teacher direction to more independence. Inquiry-centered learning does not unfold naturally in elementary school classrooms; it is a product of helping youngsters work together in new ways. It may take several weeks or months to reach the point where you and your students are able use inquiry processes productively, but I have heard teachers give up after only one unsuccessful attempt, saying, "I knew it! These kids just can't think for themselves!" and go through the rest of the year doing the children's thinking for them. But I doubt that these teachers would ever say, "These children cannot add and subtract by themselves" and thereafter remove any further opportunity to learn those important skills.

Before you make the same mistake and end up shrieking, "Bring back the textbook! Give me back my worksheets! This business of inquiry-centered

learning just doesn't work!" you must know that children change direction slowly; the processes of inquiry will not magically emerge after a single exposure to the process. Introducing new expectancies all at once can produce a condition in which the children's cognitive systems collapse under an overload of input. Time, patience, and your belief in the importance of student-directed learning are the key ingredients of a successful transition.

OPEN INQUIRY

Questions are at the heart of inquiry, all inquiry begins with a question, and different kinds of questions suggest different kinds of inquiry. Therefore, there is no single form of inquiry that is best for every instructional situation. When young children are first introduced to inquiry through observational experiences, for example, they are acquiring the essential skills and attitudes that are prerequisite for participating in actual inquiry lessons. Open inquiry will work best for them. Open inquiry begins with spontaneous questions that are the heart of natural childhood interests; children's questions, in turn, lead to exploration and discovery.

Young children come to school with a lot of questions of their own, but some teachers are not always encouraging. For example, Thomas Edison's last day in school came when he inquired, "How can water run uphill?" after he noticed that a river in Ohio did just that. Young Tom was very curious about his world, and he tried to learn all about it by asking a constant stream of questions. His first-grade teacher became so annoyed at Tom's incessant questioning that he angrily labeled Edison "slow witted." This infuriated Mrs. Edison to the point that she took Tom out of school and taught him at home. Like young Thomas Edison, children come to us with a strong desire to ask questions and often dream up some "winners." Here are a few questions and comments I fondly remember while working with children:

- "Do caterpillars *know* they're going to turn into butterflies?"
- "Why don't airplanes have to flap their wings like birds do?"
- "Are babies born with brains?"
- "Why do cats have nine lives?"
- "Why are museums called *museums*?"

Wouldn't it be interesting to know what the children had in mind when they asked those questions? When you listen carefully and sensitively to their questions, you communicate to children that they are worthwhile individuals whose curiosities are valued. This is something the children need to know, for question asking is an indispensable part of the inquiry process. And don't be afraid to admit you don't know the answer when children ask questions: "I don't know the answer, but that's a very good question." Then find the answers together: "Let's look that up on the Web." "Let's look that up in the library." "Do

we know anyone who might have the answer to that?" If we want to encourage children's natural curiosity, we must model the joy of wondering, being curious, posing questions, and exploring.

First-grade teacher Lauren Drake understood that simply tuning in to her students' questions was but one part of her responsibility to help develop inquiring minds; the second part was helping children answer or clarify their curiosities. During the past few days, for example, her children had become deeply fascinated by a construction site that had sprung up near the school. They loved to watch the workers and machinery from their playground. Since they had been working on a thematic unit about their community, "Famous Buildings in Reynoldsville," Ms. Drake felt that adding the site to the buildings to be studied would greatly enrich the topic.

The first thing Ms. Drake did was to find out what the children already knew about the construction project. Most were aware that it was going to be a new restaurant, but that was about the extent of their knowledge. Next, she wanted to know what questions the children had about the building: "What's the name going to be?" "What kind of food will it have?" "What does the sign look like?" "How will they build it?" What's it going to look like?" Their questions gave Ms. Drake direction about what to focus on and how to plan for subsequent learning. She listed each question on a large chart and asked the children, "How do you suppose we can find answers to these questions?"

Ms. Drake and the children engaged in a short period of collaborative planning and decided that a visit to the site would provide them with most of the information they were looking for; Ms. Drake made the proper arrangements. Upon arrival, the children were given a safety briefing before going on a tour. Each child was assigned to a group with one adult and two other classmates. The children were dressed in the appropriate high-visibility vests and safety helmets during a guided walk led by Charles Doty, the head construction engineer. Each group was assigned to gather information related to their original questions. Most students were equipped with clipboards and pencils. Because they were first-graders, a few children could write key words with invented spelling. Others drew pictures or dictated their information to an adult leader. Those without clipboards took digital photographs, assisted by the adults. Still others were assigned to collect sample menus, placemats, napkins, and other restaurant essentials that were made available.

When they returned to the classroom, Ms. Drake helped the children pull together and summarize their experience, making sure they addressed all their questions. Using Kid Pix, Ms. Drake helped the students create a photo essay that they added to their evolving "guidebook" on types of buildings found in their community.

NCSS STANDARDS

This activity aligns with NCSS standards:

- **V.** *Individuals, Groups, and Institutions*
- **VII.** *Production, Distribution, and Consumption*

Children radiate exceptional curiosity about the world around them and look at life as a mystery to be searched and solved. Nothing is too small for their eager minds; nothing is so insignificant that it passes them by. Observations of children in "their world" lead almost everyone to conclude that they are doers, thinkers, and natural inquirers. Piaget (1969/1970) was so impressed with these natural childhood tendencies for spontaneous inquiry that he used them to characterize his idea of *active learning*: "Active methods . . . give broad scope to the spontaneous research of the child . . . and require that every new truth to be learned be rediscovered or at least reconstructed by the student and not simply imparted to him" (p. 21). Ms. Drake has translated Piaget's thinking into her description of early-grade constructivist inquiry: "Children have an instinctive curiosity that compels them to probe their world," she says. "The very nature of childhood drives youngsters to explore, and this need must be taken advantage of through question-driven investigations in social studies classrooms. What's interesting is that the children don't even know they're in social studies class. They think they're just having fun!"

Throughout the open inquiry process, the students are almost entirely independent, with minimal guidance from their teacher. The traditional view of students as receivers of information and teachers as dispensers of knowledge has been turned upside down. Their motivation to investigate can be found in sources as diverse as investigating a construction site or responding to a story read by the teacher—anything that provokes students to think and question.

As an example of using a story to stimulate questioning, Paula Hunter took a moment to read the following paragraph describing a day in 1620 when an American Indian walked into the Pilgrim settlement at Plymouth colony (Penner, 1991).

> *. . . of course the Pilgrims couldn't understand the Indian's language.*
> *But this Indian spoke English! Before the Pilgrims could shoot, he said in a loud voice, "Hello, Englishmen!" The Englishmen were astonished.*
> *His name was Samoset. He acted like a friend. But was he one?*
> *The Pilgrims gave Samoset some food to eat. They gave him a place to sleep. They watched him carefully.*
> *The next day he returned to the forest. But soon he came again, and this time he brought with him another Indian named Squanto. He [too] could speak English well.* (pp. 26–27)

Ms. Hunter gave this selection to a group of fourth-graders during a teacher-guided study of the Pilgrims and the settlement of Plymouth. The students were able to fit in most of the events to their existing knowledge of the Pilgrims' voyage on the *Mayflower* and the founding of the Plymouth Colony, but all seemed to have the same question: "How could the American Indians possibly learn to speak English before the Pilgrims came to Plymouth?" Mental conflict was created and the students

were genuinely aroused to investigate their curiosities: "How did Samoset and Squanto (Tisquantum) learn to speak English, if this was their first contact with outsiders?"

Are you the least bit interested in learning how they did it? If so, you are experiencing a constructivist moment: You have become determined to dig up new understandings through open inquiry. How might *you* go about finding an answer? Ms. Hunter's students searched websites (e.g., http://mayflowerhistory.com/) and learned that Samoset was actually from an Indian group in Maine and had picked up a few English words from the fishermen who frequented the waters off the coast. Tisquantum had actually been to England twice prior to 1620, where he learned to speak English well.

As students accumulate open inquiry experiences like this, their own curiosities will begin to inspire the kinds of questions that often lead to subject matter investigations.

Tom Page had just finished reading Lynne Cherry's heartrending picture book *The Great Kapok Tree* (Harcourt Brace). In this story, a number of Amazon rainforest animals plead with a woodcutter not to destroy their home. Each appeal presents a scientifically accurate and convincing case for preserving our natural environment. The message of this preservationist book was clear: "Save the rainforest!" The open discussion that followed the book reading experience focused squarely on that message; students talked about plight of the animals in the book as well as a wide variety of other animals in danger of disappearing forever—giant panda, green sea turtle, African elephant. Their main concern had to do with the human actions that have endangered Earth's wildlife, largely by destroying natural habitats. The children's interest in the topic was well indicated by the number of spontaneous questions they raised: "When are animals considered endangered?" "What animals are regarded as endangered today?" "What are some ways we can help protect endangered animals?"

"Those are very interesting questions," observed Mr. Page, as he recorded each on a large sheet of chart paper. "Now, wouldn't it be great to know the answers?" For the next few days, Mr. Page's students looked up information in the classroom, in the library, and on the Internet, and they even took it upon themselves to search for all they could on their own at home in the evening. Having generated their own questions for inquiry, the students couldn't stop looking for answers until they were satisfied they had done all they could. Mr. Page capitalized on this deep personal concern and used the students' questions as a base for initiating an inquiry into the ways human beings have affected Earth's fragile ecosystem. Using this most basic self-initiated course of action, Mr. Page's students personified what it means to operate as young social scientists.

NCSS STANDARDS

This activity aligns with NCSS standards:

III. *People, Places, and Environments*

IX. *Global Connections*

The origin of a question is significant in open inquiry, so don't discount the fact that even when you are giving talks or lectures, you will be able to stir the curiosity of students to the point where they will acquire a powerful need to know. When they reach that point, students will be enlivened to apply a variety of research strategies to seek helpful information and useful knowledge.

GUIDED INQUIRY

As students gain experience, social studies inquiry can begin to vary with respect to how much direction comes from the learner and how much comes from the teacher. While the major purpose of open inquiry is to promote curiosity and scientific reasoning skills, other forms of inquiry may be required when the instructional objectives change, such as focusing on the subject matter specified by your district's social studies standards. A gradual progression to guided inquiry, coupled with appropriate scaffolding, must be provided if you expect to develop a full range of students' inquiry abilities. Guided inquiry, considered an ideal transition point between open and formal inquiry, helps you focus on specific subject matter because the teacher provides a question for investigation, while the students come up with their own investigative approach. The children determine how they will access information in both open and guided inquiry; the major difference between the two is the source of the question. Learning can still be inquiry based when the questions are provided by the teacher, as long as students carry out independent investigations.

The question should hold a high degree of mystery and intrigue, for children find it difficult to attach themselves to anything they care little about. I clearly recall one youngster's reaction to a teacher who passed out a list of 12 topics related to the Civil War and directed the students to select one for a written research report (and called this an inquiry lesson). The student's comment regarding the assignment was quite fitting: "Social studies can be so boring when the teacher makes you research stuff you don't even care about!"

What *are* good inquiry questions? Obviously, the best are those that arouse interest. Herein lies the first major question of guided inquiry: "Just what are my students interested in?" First and foremost, students will develop interest if they can connect themselves to the question; they must be convinced that the question is worth thinking about. A proper question must be clear, understandable, and meaningful, and it must involve a high degree of mystery. In addition, the question must lie within the students' zones of proximal development (ZPDs)—offering just the right amount of intrigue to challenge previously established ideas but not so much that it is either too easy or too difficult to understand. If the question is too difficult, students will be intimidated by it; they have too little or no background knowledge to help make sense of it. By contrast, if it can be easily unraveled with information the students already have, it is obviously not a challenge, and the students will quickly discard it.

Teachers have a crucial role in creating the spirit to delve into a question. An important function is to take on the role as models, thinking aloud about fascinating things and exhibiting the behaviors they would like their students to use. They ask questions: "What's going on here?" "What do we need to know more about?" They encourage students to ask questions, too. Teachers must show that they are open to new experiences. Students welcome teachers reaching out for the different and unusual—teachers looking at life with passion. Teachers stop, look, and listen; they feel, taste, and smell. They ask, "What is it? Where does it come from? What is it for?" They perform their own classroom investigations and, through their passion for new discoveries, offer the greatest form of encouragement to their students. We must do our best in dynamic social studies classrooms to nurture curiosity for life; one of the best ways to do this is to be a teacher who responds to the world with a probing, wondering mind and regularly proposes, "What do you think? Let's find out!" Discovering something new is usually accompanied by a strong feeling of pleasure and satisfaction; this is what drives people to explore and investigate—It feels good!

During the earliest stages of guided inquiry, then, a personal need to know will often be effectively created by a teacher's attention-grabbing question. To illustrate how this process works, I will demonstrate how Mr. Page's treatment of rainforests would change if he were to use guided inquiry instead of open inquiry, as described earlier. Mr. Page began guided inquiry into tropical rainforests by having his fifth-graders read Tim Knight's fascinating book *Journey into the Rainforest* (Oxford University Press), about what to wear and what to expect when traveling to the world's rainforests.

After they discussed the book, Mr. Page pulled out an official-looking letter from the director of a zoo and read it to the class. (The letter was actually written by Mr. Page.) It said that the zoo was planning to redesign its rainforest exhibit and was looking for input about how the lives of the plants and animals of the rainforest are entwined. Could the class please consider developing a guide book that would be used by visitors to the zoo describing the immense biodiversity of the tropical rainforest? This was all it took to launch Mr. Page's students into something they really wanted to learn about.

The class was eager to investigate the rainforest topic, but it now was in deep discussion about a way to generate useful and applicable knowledge. Because Mr. Page often used technology to connect students appropriately with rich sources of learning and learning materials, the children agreed that a WebQuest could be an ideal source for their needs.

A WebQuest (http://webquest.org) is described by its founder, Bernie Dodge of San Diego State University, as an inquiry-oriented activity in which

NCSS STANDARDS

This activity aligns with NCSS standards:

III. *People, Places, and Environments*

IX. *Global Connections*

some or all of the information that learners work with comes from resources on the Internet. Because Dodge felt that there was questionable educational benefit in having learners surf the Web without a clear task in mind, he created WebQuests to help achieve efficiency and clarity of purpose. Using WebQuests is an excellent way to integrate technology into the social studies curriculum. According to Dodge, the six building blocks of a WebQuest are:

- ***The introduction.*** The introduction engages and excites students and captures their interest. The goal of the motivational component is to "hook" the students and connect the topic to their existing knowledge and past experiences.
- ***The task.*** The task clarifies the main research question and describes the activity's end product. Considered by Dodge to be the single most important element of a WebQuest, the task must be doable and interesting. First, the teacher finds resources on the Web and then describes the end product that will incorporate the information from the various sites, such as publishing their findings on a website, collaborating in an online research initiative with another site or school, or creating a multimedia presentation. Dodge's WebQuest Taskonomy: A Taxonomy of Tasks is a highly useful taxonomy of 12 end-product categories and includes many suggestions to optimize their use (http://webquest.sdsu.edu/taskonomy.html).
- ***The process.*** The process explains strategies students should use and the steps they will be expected to follow to complete the task or activity. The process should be detailed as clearly described steps.
- ***The resources.*** Resources are the research materials students will use to complete the task. The list of resources includes bookmarked websites and books and other documents physically available in the classroom or library. Because teacher-selected websites are included, the students are not left roaming off course throughout any portion of the research process.
- ***The evaluation.*** The evaluation assesses the results of the students' work. The standards should be fair, clear, consistent, and specific to the tasks set. Traditional evaluation techniques such as tests and quizzes are not the most effective tools for evaluating WebQuests, since students researching different components of the overall question will be involved with dissimilar subject matter. Individual evaluation strategies such as portfolios and rubrics are recommended.
- ***The conclusion.*** The conclusion brings closure to the experience; it sums up the activity and encourages students to reflect on the process and results.

Mr. Page had created a number of other WebQuests for his social studies classes and often exhorts others to follow his lead: "It's easier than you might think!" he points out. Many good sites help walk you through the process; one of the most convenient is Dodge's WebQuest page.

In this case, however, the students' motivation to use a WebQuest for the rainforest task was very high, and Mr. Page wanted to strike while "the iron was hot." So, although he knew that *the quality of what he finds varies widely from site to site*, he decided to quickly check a database of previously prepared WebQuests. One of his favorite sites is San Diego State University, which has maintained a database of sample WebQuests for years (http://webquest.org/search/index.php). The database is kept up to date, with links being weeded out whenever they go bad. (You can search more broadly by going to Google. Type a word or phrase that describes a topic for which you'd like to find a WebQuest, and see what you get.)

NCSS STANDARDS

This activity aligns with NCSS standards:

III. *People, Places, and Environments*

IX. *Global Connections*

The introduction activity had already taken place, as the students reacted to the book and generated a strong spontaneous interest in the ecology of rainforests. Mr. Page addressed the task activity by calling the students' attention to these WebQuest directions: "You will work with a group to develop a guide book that will be used by visitors to the zoo describing the immense biodiversity of the tropical rainforest. Your group will use some multimedia application such as PowerPoint to prepare the guide book. It must be accompanied by a creative product such as a painting, skit, poster, or song designed to sway opinions." Next, Mr. Page asked the students to examine the process activities: "You will work in a team of four people:

- The *geographer* will be responsible for finding out about the location and physical characteristics of tropical rainforests.
- The *botanist* will be responsible for finding out about the species of plants in a rainforest.
- The *biologist* who will be responsible for finding out about the plant species living in a rainforest.
- The *demographer* who will be responsible for finding out about the people who live in rainforests.

Mr. Page continued by directing the children to the WebQuest resources activity: "Almost all of your information will be collected from Internet sites, but you are also encouraged to use additional information books and other print materials. And, you will be doing a multimedia presentation. Be sure to collect pictures as you make your journey through Internet and print sources." Mr. Page then asked the students to examine the following preselected links:

- ***A Student Guide to Tropical Forest Conservation:*** http://www.fs.fed.us/global/lzone/student/tropical.htm
- ***Rainforest Heros:*** http://ran.org/index.php?id=957
- ***Passport to the Rainforests (Ecosystems):*** http://passporttoknowledge.com/rainforest/main.html
- ***Amazon Interactive:*** http://www.eduweb.com/amazon.html
- ***Rainforest Facts:*** http://www.rain-tree.com/facts.htm
- ***Rainforest Biomes (Plant/Animal Adaptations):*** http://www.mbgnet.net/sets/rforest/index.htm

- ***Journey into the Amazon:*** http://www.pbs.org/journeyintoamazonia/enter.html
- ***Endangered Species (Examples of Endangered Rainforest Animals):*** http://library.thinkquest.org/27257/rainforest.html
- ***Children's Rainforest Information Page:*** http://www.rainforestinfo.org.au/children/edsup.htm

For the evaluation activity, Mr. Page informed the students: "Your guide books will be judged for creativity, effectiveness, accuracy, and neatness. Based on the rubric each of you received, each student will receive a group grade as well as an individual grade for the separate guidebook responsibilities."

Finally, after the one-week WebQuest was completed, the conclusion discussion revealed that the students acquired information and built concepts associated not only with their own group responsibility but also about many more rainforest issues. They indicated a much stronger appreciation for the many creatures that rely on this tropical ecosystem and why rainforests need to be saved.

NCSS STANDARDS

This activity aligns with NCSS standards:

III. *People, Places, and Environments*

IX. *Global Connections*

Web-Based Inquiry Mills (2006) suggests that one of the greatest values of inquiry is that it develops independent learners who acquire "habits of mind" (e.g., question, gather data, analyze and organize data, propose solutions) that can last a lifetime. These habits of mind can be effectively supported by legitimate and credible Internet sources: "A Web-enhanced inquiry approach maximizes information-seeking, evaluating, and applying" (p. 176). Jakes and colleagues (2003) suggest an intuitive eight-step process designed to help students carry out their research when searching for solutions to their inquiry questions on the World Wide Web as a primary information resource:

1. Ask an essential question generated by the students or by the teacher. An essential question is defined as a question that requires students to make a decision or plan a course of action: "Should Puerto Rico become the 51st state of the United States?" The question should not be restricted to a "right" answer.
2. Prepare a list of subordinate questions that help extract the factual information needed to clarify the essential question. These questions have such beginnings as, "What is (are) . . . " or "When did . . . ," depending on the subject. An example is "What are the pros (and cons) of statehood?"
3. Examine the subordinate questions for key words that can be placed in Web search tools such as Google or Yahoo! to locate relevant information resources.
4. Use the keyword pool to help locate useful information through such internet search engines as Google or Yahoo!
5. Evaluate Web sources from which your students have collected information with a three-part process:

a. ***Information applicability***—"Is the information useful?" If the answer is yes, students continue to step b. If not, they continue searching.
b. ***Information authority***—"Was the information published by a qualified expert, organization, or agency?"
c. ***Information reliability***—"Can the accuracy and truthfulness of the information be checked by examining other websites or library resources?"

6. Evaluate the accumulated data and decide whether there the data is sufficient to provide a satisfactory answer. If not, students should continue the search.
7. Organize the data and construct a well-reasoned response to the question.
8. Develop an interactive presentation that communicates the results of the research. The presentation may include text, art, animation, and other useful audio and visual elements.

At its core, guided inquiry is an active learning process through which students answer teacher-initiated questions with self-selected data collection strategies. Some social studies educators may argue that the most meaningful inquiry takes place only during open inquiry episodes, when students ask and answer their own questions. However, an activity can still be considered meaningful

The Internet has had a profound impact on social studies inquiry. Whether it is used daily or occasionally, the ways to integrate the Internet into a classroom are limited only by your imagination.

constructivist inquiry when the questions are asked by the teacher and students are motivated to search for and come up with their own results and conclusions.

STRUCTURED (FORMAL) INQUIRY

As discussed earlier in this chapter, inquiry does not always imply following the steps of the scientific method; the process can be open ended and unstructured. However, as you and your students gain confidence in using inquiry, you will find yourselves drawn to the potential of applying the prescribed procedures of the scientific method. The *scientific method* is an organized plan for gathering, organizing, and communicating information about our social world.

Teaching Tips

Authors use slightly different terms and outlines of the scientific method, but most elementary school social studies investigations involve the following steps:

1. To pinpoint exactly what the students will investigate, inquiry starts with *a good question*.
2. To help find an answer to the question, students *develop a hypothesis and/or prediction*, a proposed explanation.
3. Students *assemble and analyze evidence* to test the hypotheses or assess the prediction.
4. The students form a *conclusion*; that is, they either support or reject the hypothesis or prediction.

Asking Good Questions The scientific method starts with a good question. In general, there are two fundamental sources of questions that set off structured inquiry episodes: (1) those sparked by a teacher and (2) those proposed by the students. Herein lies one of the major inquiry debates among social studies authorities. Some take the position that if teachers propose the question, students have little or no personal stake in the investigation; therefore, they are not taking part in real inquiry. The opposing argument is that, because of the powerful focus on standards, inquiry topics must fit into your larger curriculum structure. And, teachers may ask, "What if my students never ask a question about Chinese civilizations? Does that mean they'll never have the opportunity to learn about one of the cradles of the human race?"

In structured inquiry, it is hard to tell when either source is most powerful, but an interesting parallel can be drawn between students' earliest attempts at inquiry and the responsibilities assigned to professional social scientists during the early days on the job. Many report that the research questions on which they were to work were given to them by supervisors or by more advanced

co-workers. Their job was to assemble and assess information in a competent way until they were ultimately given the responsibility to design their own questions and research strategies. Might teacher-sparked questions, then, be a comparable way to initiate structured inquiry in social studies classrooms before students take the lead for their own questions?

Regardless of the source, several factors help determine the quality of the questions designed to initiate student inquiry:

- ***Most importantly, the question should be something the children are sincerely interested in.*** Addressing good questions about things of interest is the heart of effective lifelong thinking.
- ***The answer must be open to investigation.*** It cannot result in obtaining a simple fact, such as "Who designed the first American flag?" The question must engage students in finding answers or solutions by conducting meaningful research: "Did Betsy Ross really make the first U.S. flag?"
- ***The question should have a clear focus.*** The question should be unambiguous so that the students will have a clear direction of where to proceed with their research. For example, the question "What is government?" is much too wide-ranging. Where would a student start? The question could be refined by breaking it up into several smaller questions such as, "What do we consider to be the five most important government documents in the history of the United States?"

Developing Hypotheses or Predictions Once students have clarified the question and accepted it as interesting and worthwhile, they are ready for the next big step—coming up with a *hypothesis*, or a tentative explanation for the question. The problem is, a true *hypothesis* has a very precise and intricate meaning when it is used as part of the scientific method. Dissecting a true hypothesis would be fine for a college statistics course, but the ability to construct true scientific hypotheses may be beyond the capabilities of elementary school students. Instead, consider an elementary school hypothesis to simply be "an educated guess" or a "prediction." You may often hear the terms *prediction* and *hypothesis* used interchangeably. That is because predictions, like hypotheses, are proposed answers to the research question that are based on a pattern of past experience and prior knowledge.

Did you ever go to a movie and just simply know how it would end? If you did, you made a hypothesis, or prediction. How did you do that? You used clues from past experiences and prior knowledge to figure out what was going to happen. Children regularly make predictions based on prior experience or on information they already have. In short time, they will be able to activate their prior knowledge and past experiences to come up with predictions for inquiry questions, too. If their background knowledge and experiences are satisfactory, students will be able to make strong predictions; students should not make wild guesses; hypotheses must be supported by sound reasoning.

You can help your students make a hypothesis by asking questions such as these: "What do you already know about this situation?" "What have you already learned that we might be able to use now?" "How could this information help us come up with an answer to our problem?" "What ideas can you suggest as a solution based on what we've just discussed?" The purpose of these questions is to help students attach information they already know to the problem.

Making hypotheses involves risk for students, so be especially careful to attach importance to each individual's input. It is easy for teachers to acknowledge hypotheses they might agree with or those that they think might be "sensible." But responding to incomplete or unusual suggestions is not quite as easy.

Teaching Tips

Remember that students' ideas are nothing more than educated guesses, so dignify all responses by offering comments and/or questions such as these:

- "I heard you say . . ."
- "What I believe you are telling me is . . ."
- "That is a very interesting idea. I never thought of it that way."
- "You have an intriguing idea, but I'm a bit confused. Could you enlarge upon it a bit?"
- "What if I told you (add some information)? How would that change your prediction?"
- "What clues did you use to make your prediction?"

Once your students have made their predictions, they will be ready to move on to verify them with a spirited, "I can't wait to find out what happens" attitude.

Gathering the Data The portion of the scientific method that comes between the question and answer includes locating all the information that will be used to find an answer for, solution to, or explanation about the question. Because they use the scientific method quite often in science class, most students will believe that they should conduct a science-like experiment any time they conduct inquiry in social studies. However, more often than not, students will be doing something other than hands-on experiments during their systematic investigations in social studies.

One major type of research carried out by social scientists is referred to as *quantitative research*, which involves numbers. Only measurable data are gathered and analyzed in this type of research. Data most often appear in the form of tables, graphs, and charts. A second type of social studies research, is called *qualitative research*, and it involves verbal data—words. Forms of the data collected include

interviews and group discussions, observation, field notes, various written texts, pictures, and other verbal materials. Some researchers feel that one is better or more scientific than the other, but both yield important information to social scientists.

All this may prompt you to ask, "Which method should I use in my social studies classroom?" Each method has strengths and weaknesses, so it would be ideal to use both methods. If the goal of your inquiry question is to find out something through numerical evidence ("What percentage of fifth-graders think the tropical rainforest is important to their everyday lives?"), then you should make use of quantitative research, such as a survey. However, if you wish to explain why a particular event happened ("What caused the extinction of the dodo bird?") or why a certain phenomenon exists ("Why are tropical rainforests disappearing from the face of the globe?"), then you should make use of qualitative research.

In elementary school classrooms, research is typically conducted in one of three major ways: *library research*, *descriptive research*, and *historical research*.

Library Research *Library research*, perhaps the most common source of information for inquiry-based questions and problems, involves materials such as encyclopedias, informational books, computers, magazines, newspapers, pamphlets, almanacs, catalogs, dictionaries, travel brochures, atlases, guides and timetables, posters, films, videos, photographs, and even the phone book. Library research also embraces Internet research, especially the World Wide Web. The Internet very quickly provides information on almost every topic a child might study. Surfing through the wealth of educational sites on the Web is fun and can be instructive, as students follow links from page to page, hoping to uncover useful information. But surfing can also be overwhelming when young children seek out focused information. Therefore, it would be wise to encourage appropriate use of "child-specific" search engines, such as *Ask Kids* (http://www.askkids.com/), which allows students to search for information by asking broad questions. Or you might furnish reference links on the Internet start page to get the young researchers moving in the right direction. Other child-friendly search engines include:

- ***42eXplore by Topic:*** http://www.42explore.com/topic.htm
- ALA | Great Web Sites for Kids
- ***Awesome Library—K–12 Education Directory:*** http://www.awesomelibrary.org

School librarians know the Web well, and a librarian can help find excellent results. It must also be emphasized that inquiry-oriented instruction does not necessarily preclude the use of textbooks as important information sources, for even textbooks can do much to enliven the spirit of inquiry.

Descriptive Research *Descriptive research* helps students uncover important information about the question under study by seeking answers to the questions

who, *what*, *when*, *where*, and *how*. There are several different types of descriptive research, but the three most useful in elementary school classrooms are *observational research*, *surveys*, and *interviews*.

Observational research can include all the experiences through which students observe, handle, participate in, or try out genuine objects or events. For example, while investigating significant American Indian cultural traditions, one class visited a display of authentic arrowheads, beaded items, pottery, stone artifacts, and other items from the past. Likewise, an outing to the commuter train station to observe the "crunch" of rush hour is considered observational research, as is a field trip to the water-powered grist mill where grain was ground to the customer's order and classroom visit by a Civil War re-enactor.

Survey research consists of a series of questions designed to ascertain the feelings or beliefs people hold about a question or problem. The first responsibility in conducting a survey is to design clear, understandable survey questions. Next, the students must decide whether they want to ask the questions orally and record responses on a notepad or whether they want to construct a paper questionnaire and hand it out to be completed privately. Then the students must agree on who will be asked the questions. Should they ask the questions to their classmates, all the classes at the same grade level, randomly selected students from the entire school, students in the school band, support staff at school, adults in their neighborhood, or teachers at the school? After collecting the data, the students must organize and analyze it. The most common way elementary school children organize and display survey information is by making large, chart-size bar graphs or picture graphs. But many tech-savvy teachers like to select from among the free graph-making tools available online. The students culminate the survey process by presenting the results of their research to an authentic audience.

Students can use *interviews* to acquire useful information about almost any question or problem. Interviewees bring both a depth of information and the power of personal experience to a story that makes it attention grabbing and realistic. Just about every child has seen an interview carried out on television, and children welcome the opportunity to try to do what a reporter does. It would be wise to have your children review their knowledge of interviews and together discuss the processes involved in conducting an actual interview. The steps are presented here:

- ***Prepare for the interview.*** Make a list of questions to get more in-depth information about the topic under study. Questions should focus on *who*, *what*, *when*, *why*, and *how*.
- ***Conduct the interview.*** Ask the questions in a conversational style instead of mechanically reading them word for word. The interviewee's interesting ideas and insights may lead to extra questions, or follow-up questions might be needed to explain points that are not clear. Be sure to treat the

interviewee with respect; always pay attention to what is being said, be careful not to interrupt, and be careful not to push the interviewee into answering a question if she or he appears uncomfortable.

- ***Share the results of the interview.*** Students often think their work is over once they complete the interview, but they are only partly finished. Now is the time to check all the information and pull it all together in a meaningful way. Will they now write a story? Compose a newspaper article? Make an oral presentation to another class or even a community group?

Historical Research When children delve into conditions of "long ago," they must gather and evaluate relevant traces of the past. *Historical research* is the process of searching for answers to questions about the past by examining and interpreting such evidence as artifacts, diaries, newspapers, pictures, letters, music, oral history, advertisements, or speeches (see Chapter 7). The student's job is to find evidence, analyze it, and use it to create an explanation of past events. Sadly, however, student explanations often end up as a pointless outline of dates, names, and events. Social studies teachers expect more than this; they want their students to carry out research in such a way that historical facts come to life and gain personal meaning through the construction of new ideas. Students should think about using historical research when they have these kinds of questions for inquiry:

- "What happened?"
- "When did it happen?"
- "Why did it happen?"
- "To whom did it happen?"
- "What did it mean to the people at that time?"
- "What does it mean to people today?"
- "What do historians have to say about what happened?"

Analyzing the Data and Drawing Conclusions Once student investigators have collected their data, they must find a way to order and interpret what they found; they must make sense of it. Students often do this by analyzing the data for patterns, typically with charts or graphs, to determine whether the results support the hypothesis or prediction. In essence, they ask themselves, "What does this data mean to me?"

Students have located information related to the question; now they must examine and group the information so that it makes sense. They may do this by constructing a map or a graph, designing a chart, or creating some type of graphic organizer that highlights relationships among the data. A very effective method for helping students learn to complete these tasks is to model the process for them.

For example, Bernard Green's sixth-graders had been studying the climate and topography of the Middle East, when their interests focused on the camel, an animal that is almost perfectly adapted to the desert. Someone asked the question, "Why is a camel known as the 'Ship of the Desert?'" That's all it took for Mr. Green's class to launch itself on a fascinating camel inquiry expedition. The students made predictions and searched a variety of references, finding a wealth of fascinating camel facts. They filled their individual research notebooks with their facts and jointly listed everything they uncovered on the white board (eliminating any duplicates). When they had filled the white board with their facts, Mr. Green helped them organize the data into a web to highlight the relationships. He used timely questions and prompts to help them categorize the facts—facts related to food, location, size, body parts, strength, and other interesting information. Working from these main categories, the students plotted a fact web.

This stage of the inquiry process is a time for reflection—looking back at the question, revisiting the predictions or hypotheses, summarizing the data, and drawing conclusions: "Has a solution or an answer been found?" Do new questions come to light?" At this point, the students make a final statement that summarizes the investigation; it is called the *conclusion*.

When a scientific investigation has been completed, one or more major events may follow. Primarily, an inquiry-based classroom relies on communication. One event, therefore, is sharing the results with an authentic audience, using appropriate vehicles of communication. In the adult world, much of the reward gained from research comes from having an impact on desired audiences; professors of education experience great pleasure after receiving approval from their peers while delivering a speech about their research into a revolutionary new instructional approach, and social scientists are thankful for the recognition they receive from others in their field after publishing a paper describing how a person's education level influences civic participation, volunteerism, and philanthropy. Each of these individuals appreciates the resulting respect for his or her research labors and experiences an immeasurable amount of inner satisfaction for the accomplishments.

Likewise, young learners take pleasure and pride in the recognition they receive after sharing the results of their research with an authentic audience. In the case of Mr. Green's class, for example, the student researchers were divided into collaborative author/illustrator teams, each of which wrote a short illustrated paragraph on one of the categories from their camel web. The paragraphs were later sequenced and bound together into a picture storybook titled "The Ship of the Desert." And, because most elementary school students take great pleasure in reading aloud what they have written, they happily shared what they had written with the other third-grade classrooms in their school.

Keep in mind that sharing authentic research goes beyond the traditional formal written report by engaging children in varieties of communication

possibilities—oral presentations, graphic representations, photographs, audio—or videotapes, debates, dramatic skits, bulletin board displays, and a variety of other forms. A special area of interest has been the use of *hypermedia*, a communications tool that combines video, graphics, animation, and text. Known also as *presentation software*, hypermedia authoring programs enable students to organize and communicate information in innovative and thought-provoking ways, accessing and integrating information from such diverse sources as the Internet, sounds or clip art pulled from public domain software, photographs from a digital camera or scanner, and clips from a video camera or CD-ROM. Some widely used presentation software programs are Microsoft's PowerPoint, Google's Google Docs(http://docs.google.com), HyperStudio, AppleWorks, and, especially for the younger set, the SlideShow portion of Kid Pix. These are not the only hypermedia tools available to teachers and students, but they are excellent examples.

Despite the many advantages of inquiry, social studies teachers must be careful not use inquiry as the only tool to meet every instructional goal; social studies demands the use of varied techniques and strategies. Any single instructional method, regardless of its effectiveness, eventually becomes tiresome and monotonous if it is used exclusively.

The process of using *qualitative research* to carry out the process is summarized through a classroom example in Figure 5.2.

As Mr. Page's students came back to their classroom after recess, he had begun playing a tape of rainforest sounds. He asked the students to describe the environment from where these sounds might have been coming. Then he asked, "What does the tropical rainforest look like in your mind?" As they shared their ideas, Mr. Page recorded what they already knew about the rainforest on chart paper. Using a wall map, Mr. Page helped the students locate the world's largest tropical rainforests. He then introduced the poetic book *Welcome to the Green House* by Jane Yolen (G.P. Putnam's Sons), in which the author explores the sights and sounds of exotic animals and other features of a tropical rainforest. Following the reading, Mr. Page led a group discussion of the new information presented in the book and helped the students compare it to their initial list. The students enjoyed the book and follow-up discussion; they appeared particularly interested in the richness of animal life in the rainforests. Because "the interdependence of animals and plants in an ecosystem" was an expectation in his district's science and geography standards, Mr. Page seized the opportunity to capitalize on the students' interest and introduce a question that the students would research through scientific inquiry. Mr. Page's sequence of instruction is outlined in Figure 5.2.

The students concluded that rainforests are very important to the world for many reasons, one of which is that the canopy structure of the rainforest provides an abundance of places for animals to live. The canopy offers sources of food, shelter, and hiding places, providing for interaction between different species.

The basic steps that will help you teach your students about inquiry and how to examine problems logically are found in the scientific method and, contrary to what some may believe, the scientific method is relevant even for early-grade children. Young children need to have a chance to ask questions,

FIGURE 5.2 Using Scientific Methods for Classroom Inquiry

Step	Description	Example
Observe and Question	Students observe something that they want to know more about and ask a question. Or, the teacher may ask a question.	After listening to *Welcome to the Green House*, the children were intrigued that rainforests were tremendously rich in animal life. They will be assigned to small investigative groups to research this question: "What makes it possible for rainforests to have so many different kinds of animals?" Now that they have a good idea of the question they want to ask, it's time to move through the steps of the scientific method to find an answer.
Form a prediction or hypothesis	A prediction or hypothesis is a statement of what the students think will happen, or what the result will be. The hypothesis must be observable and testable, but the prediction can be a general statement.	The students agreed that, "Because of what we read in the book, we predict that the reason for the great number and variety of animals in the rainforest is the constant warmth, constant supply of water, and wide variety of food for the animals."
Collect and analyze data	An important part of the scientific method is collecting data. Students must be able to gather evidence from reliable resources to construct explanations. After the data are collected, they are analyzed. This step often involves organizing data in charts and graphing the information.	In this investigation, students considered a number of possibilities, including library and Internet resources. They decided on a combination of both for their research. The children found that rainforests are tremendously rich in animal life. They classified the animals according to where they lived in the different strata of the rainforest: eagles, monkeys, bats, birds, and butterflies in the *emergent layer*; insects, arachnids, many birds (like the toucan and the macaw), mammals (like the howler monkey and orangutan), reptiles (like snakes and lizards) in the *canopy*; a large concentration of insects (like beetles and bees), arachnids (spiders), snakes, lizards, and small mammals (like the kinkajou) that live on and in tree bark in the *understory*; insects and arachnids (like tarantulas), and the largest animals in the rainforest (gorillas, anteaters, wild boars, tapirs, jaguars, and people) as well as decomposers like termites, earthworms and fungi on the *forest floor*.

FIGURE 5.2 (Continued)

Draw conclusions	After they analyze the data, students must see if the results support their prediction or hypothesis. They should also find a way to share their results with others.	To create school wide awareness of the wonders of the rainforest, each group created a mural on which they painted or drew the different layers of the rainforest and then added small cutouts of the animals living in the different layers. The groups prepared a written script about its mural. The script included one or more sentences about each animal. (For example, "Soaring high above the emergent layer, 200 feet above the forest floor, you see animal number one. It is a harpy eagle, one of the world's largest and most powerful eagles . . . .) Each group recorded its script on cassette tape , taking turns reading a portion of the script. They placed a tape recorder near each mounted mural and posted signs inviting students and teachers to visit the talking mural display.

do investigations, and use investigation skills, too. The natural events of a classroom or of a child's own lives appear to be the richest sources of big questions to inspire inquiry. Bob Kurzinsky's second-grade class is a wonderful example of how to use *quantitative data* to initiate full-blown scientific inquiry.

When Mr. Kurzinsky's second-graders came to school in the fall, they were excited to share all the interesting things that had happened to them during summer vacation. Hands flew into the air during sharing time, in eager anticipation of who would be the first to talk. Teri's words exploded as she told about helping her parents take care of their vegetable garden. Agostino's eyes sparkled with pride as he described the new furniture that arrived at his house in the middle of summer ("A beautiful yellow sofa, just beautiful!"). Wendy sadly recounted her family's heavyhearted task of saying goodbye to their 10-year-old beagle after he was struck down by a speeding car. Kun Hwan happily described his seventh birthday party, and Frey told of his family's trip to the state aquarium.

The children enjoyed hearing all the stories of the summer, but Wendy's tragic beagle mishap seemed to generate the most interest. Her classmates felt sorry for Wendy and were very supportive but seemed quite relieved as Wendy described the new floppy-eared, sad-eyed basset hound puppy her family adopted from a local basset rescue organization. Soon they began talking about their own pets. Their interest seemed to reach its peak when Moira speculated aloud, "I wonder what kind of pet most of us have."

"Yeah," the children all agreed.

Knowing that the spark for inquiry is often set off during such discussions, Mr. Kurzinsky decided that the time was ripe for an introduction to the processes involved

in carrying out the scientific method: "That's a good question, Moira. Let's try to find an answer for it."

Mr. Kurzinsky could have simply asked for a show of hands to indicate the most popular pets, but he decided that a survey would probably be the best research tool for acquiring the data. And a graph would be a good tool to help them see relationships among the data because they had been learning about graphs in math class. The first step of the inquiry process, then, evolved naturally; the students settled on a question to explore.

Once the clear-cut question was raised, Mr. Kurzinsky invited the children to make simple hypotheses: "I think fish are most popular. One of my friends has an aquarium in her house, and there are lotsa fishes in there!" "I think cats are most popular because me and my friend have cats." "More will pick dogs 'cause everybody likes dogs."

Because a survey would be the method of data collection most appropriate for this question, Mr. Kurzinsky's issued a challenge to the students: "Let's come up with a decision about the five animals we think most of our classmates might have." The students decided that their categories should include cat, dog, bird, fish, and other animals (e.g., turtles, snakes, rabbits, gerbils).

Mr. Kurzinsky next displayed the actual survey instrument the class would use to test the hypotheses. He reproduced a set of cards for each child, with a separate illustration for each animal in the survey. On a large sheet of chart paper with the heading Our Most Popular Pets, Mr. Kurzinsky drew a large graph whose boxes were large enough to enclose the animal cards. He labeled the bottom boxes on the chart "cat," "dog," "bird," "fish," and "other animals." Mr. Kurzinsky then had each child tell the class about her or his pet and then attach the proper illustrated card to the chart in the correct row and column.

"I don't have a pet," complained Sheila. "They're not allowed in our building." The children seemed at a loss how to handle the situation until Tyrone suggested, "If you don't have a pet, you can just pretend you have one." Everyone agreed that this was a fair solution. As the cards were attached to the chart one by one and the graph's columns grew at irregular intervals, the children became engrossed in determining which animal was "winning" and often broke out into spirited cheers. Mr. Kurzinsky led a running discussion of the data, regularly asking the children how many more cards there were in one column than another, how many cards were shown altogether, whether the data were supporting their predictions, and how many cards still needed to be placed. Eventually, to the relief of at least half the children, the cat column surged ahead and convincingly overtook the others.

After a short informal class conversation, Mr. Kurzinsky helped the children examine and analyze the data:

- "Which column has the most?"
- "Which column has the least?"
- "Are there more fish or more dogs?"

- "How many _____ are there?"
- "How many more _____ are there than _____?"
- "How many less _____are there than _____?"
- "Are any columns the same?"
- "What does the graph tell us?"
- "What do we know about our favorite pets?"

To make scientific inquiry activity more authentic, Mr. Kurzinsky finds it advantageous to share the results publicly in some manner. In this case, the students' findings were published in the school newspaper, under the heading, "What We Found Out About Our Pets."

This was a valuable hands-on, minds-on way to learn how to carry out the steps of the scientific method. First, the children had a meaningful question to investigate. (Remember that all inquiry starts with a question.) Second, they made reasoned guesses, or hypotheses. Third, they used a survey-based experiment with their teacher to test the hypotheses. They decided to poll each child in the class, even those without pets. Fourth, they conducted the experiment, collected data, and arranged the data on a graph. Fifth, they carefully examined and analyzed the data. Sixth, they explained what happened to an interested audience. The children learned all these processes by being immersed in the method; the children "owned" the problem, truly cared about it, and had a deep desire to resolve it.

NCSS STANDARDS

This activity aligns with an NCSS standard:

IV. *Individual Development and Identity*

After experiencing the success of this introductory inquiry episode, Mr. Kurzinsky offered many other opportunities for scientific investigation. The children wanted to collect *pet data* from other classes to see if those data agreed with theirs. But this project raised an important question: "Is it necessary to poll every child in school?" Mr. Kurzinsky's young social scientists thought it would be wise to use some type of sampling strategy instead. Perhaps they might interview every third child who moved through the lunch line at noon? If so, they decided it would be best to have an equal boy/girl distribution and decided to alternate every third boy, every third girl, and so on. As that suggestion became too complicated, Artis suggested (not in exactly these words) that they might want to randomly select 50 pet owners from the general grade-level population by drawing names out of a hat. The students continued to debate this point quite exhaustively, for they were quite determined to make certain that their survey data were gathered from a fair, representative sample of the larger population.

The children went on to carry out inquiries on a variety of other "favorites"—fruit, shoe, crayon color, and birthday present. Eventually their interests shifted to traditional social studies content, to such questions as most preferred presidential candidate, favorite region of the country to live in, and the most important cargo to bring aboard the *Mayflower*. Thus, Mr. Kurzinsky reinforced the

idea that some of the most valuable investigations are those that develop spontaneously. Teachers must learn to recognize these natural opportunities and value their impact on children's learning.

Because there is no consensus in the educational literature about a single best approach to social studies inquiry, teachers often become anxious about the nature of inquiry-based instruction. Some think that what they are doing is not inquiry unless they allow their students to investigate their own questions through self-selected research strategies. At the other extreme are teachers who believe that inquiry happens only when they pose questions to their students and guide them toward seeking answers with the scientific method. Given these two extremes, it is not surprising that frustrations about using inquiry-based instruction abound. However, you should now understand the essential features of inquiry as a multifaceted process, its flexibility in the classroom, how willing students are to take part in it, and its essential part in your teaching repertoire.

What Is Creative Problem Solving?

We once saw a tyrannosaurus.
And we feared he'd end our lives faurus.
But, "Look!" said my friend,
"He's rubber, can bend!"
Then we realized we were in Toysaurus.

My son Jeff wrote this limerick in elementary school, as part of an integrated thematic unit on dinosaurs. His teacher sent the poem home along with a note telling us that she felt the limerick was remarkably creative. Of course, Jeff's "impartial" parents thought likewise and displayed it proudly on the refrigerator door. What do you think of Jeff's limerick? Would you say it is creative? If so, what makes it creative? If not, you've just failed this course (only kidding)!

Creative Thinking

What do we mean by *creativity*? As with love or intelligence, not even the wisest person among us can truly grasp or explain the true meaning of these complex mental attributes. Creativity comes to all of us in a variety of different ways; it is a subjective experience that is expressed differently by each person. Despite this difficulty, experts have highlighted various aspects and dimensions of creativity, and there appears to be some common threads in their theories. For example, most definitions of creativity include two major components:

- ***Novel or original behavior*—**Behavior that has not been learned from anyone else; it is fresh, new, and unique.
- ***An appropriate and productive result*—**Coming up with a socially useful or worthwhile product or an effective solution to a problem.

Does Jeff's poem reflect these two components? Is it fresh and original, or did he get the idea from somewhere else? Is it an appropriate response to the teacher's assignment to write a limerick about the dinosaurs they had been studying?

What enables some children to create in such fascinating ways, while others struggle to move beyond the ordinary? Although a certain degree of intelligence is helpful, something more is required. In Jeff's case, that "something more" was the ability to "play" with ideas—to see things in a new way. Identifying what that "something more" might be has been debated over the years, but the consensus seems to be that an individual's creativity is influenced by the intermingling of four intellectual traits:

- ***Fluency.*** Fluency is the ability to produce a large number of ideas. A child who responds to the question, "What things are crops?" with "Wheat, corn, beans, peas, and tomatoes" is more fluent than a child who responds "Wheat and corn."
- ***Flexibility.*** Flexibility is the ability to produce a number of different categories of responses. A child who responds to the question, "What things are crops?" with "Wheat, tomatoes, apples, peanuts, and tobacco" is a more flexible thinker than a child who responds "Wheat, rye, oats, and barley" (which are all grains).
- ***Originality.*** Originality is the ability to produce unusual or clever responses. A child who responds to the question, "What can you do with an empty cereal box?" with "Make a snowshoe out of it" is more original than a child who says "Store things in it." Originality is usually determined statistically; the response is considered original if it is offered by fewer than 10% of those responding.
- ***Elaboration.*** Elaboration is the ability to expand on a simple idea to make it richer. A child who responds to a teacher's request to draw a picture of the geographical area where the Sioux lived with a simple landscape drawing shows less elaboration than a child who includes buffalo, tipis, and Sioux farmers working in the fields.

Complementing these four intellectual characteristics, creative individuals display four unique emotional characteristics:

- ***Risk taking.*** Risk takers have the courage to take wild guesses and expose themselves to criticism or failure. They are strong willed and eager to defend their ideas. They have the spirit to try new things, fail, and get up to try again.
- ***Complexity.*** Students who demonstrate complexity enjoy delving into intricate problems and bringing order from chaos. They like to learn new things, are willing to examine the unusual, and are highly inquisitive.

They tackle tasks and problems in a well-organized, goal-directed, and efficient manner.

- ***Curiosity.*** A curious child is inquisitive and full of wonder, always asking questions and seeking answers. A curious child has the drive to seek out mysteries and the creativity to solve them.
- ***Imagination.*** An imaginative child dreams, often straddling the fine line between fantasy and reality. Imaginative children explore in ways the logical mind finds difficult to understand.

Creativity helps children grow into independent and productive citizens of our society. To help students strengthen their creative thinking abilities, we must know about and apply the kinds of classroom practices that are supportive of creativity. The remainder of this chapter addresses that responsibility, for encouraging creativity in children demands a great deal of creativity from their teachers.

The Creative Problem Solving (CPS) Strategy

Perhaps the oldest and most widely used strategy to support creative thinking in social studies classrooms is the *creative problem solving (CPS)* model developed by Alex Osborn (1963) and Sidney J. Parnes (1981). To understand CPS, it would be instructive to contrast it with what we have learned about inquiry. Remember that the goal of inquiry is to systematically search for facts and information to answer questions or solve problems. Some students do this well; they sort out the clues, pull them together, look for logical patterns, and deliberately arrive at valid conclusions. Others, however, attack problems in quite different ways. This variation of a well-known story helps illustrate the difference between the two:

> *An engineering major and an elementary education major were hiking in the woods when they came across a grizzly bear. Both were terrified and quickly began to search for an escape route, each in his or her own way.*
>
> *The engineering major took out his smartphone and quickly computed the mathematical differential between his speed and the bear's. His face turned ashen as he stared at the results.*
>
> *The elementary education major simply took off her hiking boots, opened her backpack, slipped on a pair of jogging shoes, and took off.*
>
> *"Boy, you are STUPID," the engineering major yelled to the elementary education major as she sprinted down the trail. "My calculations show you can't outrun a grizzly bear!"*
>
> *"I don't have to," the elementary education major shouted back. "I only have to outrun YOU!"*

This story demonstrates how two people can respond very differently to the same problem. The two response categories in this example are generally referred to as *systematic* (the engineering major who relied on facts and logical

thought) and *intuitive* (the elementary education major who relied on gut feelings and intuition). Original, intuitive solutions to problems come from an ability to shift directions in thought—to move beyond the obvious to the subtle. Some would say that the elementary education major's solution was more creative than the engineering major's. Do you agree? What made it so? Regardless of whether you are trying to figure out how to study for an exam when your friends want you to go to a movie or where to get money for next year's tuition hike, you are likely to rely on either logical inquiry or creative problem solving strategies.

Traditionally, most schoolwork has called for systematic rather than intuitive thinking, and we find that schools tend to overemphasize logic-related skills at the expense of intuitive-related skills, giving our children an apparently "lopsided" education. Teaching for creativity, however, does not minimize the importance of a *solid background of information*; creativity in social studies is more likely to occur when students have mastered the content. Creative ideas do not spring forth from a vacuum. Knowledge is but one component of creative thinking, but it is not sufficient by itself; there is that "something extra" that contributes to a creative personality.

The CPS model is a designed plan for creative thinking—a process for solving problems when you want to go beyond conventional thinking and arrive at novel and useful solutions. The original CPS model has six steps. That model works well with high school students and adults, but I prefer a simplified four-step model for elementary school students:

- ***Problem finding (clarify the mess)***—What is the problem that needs to be focused on? What do you want to accomplish?
- ***Idea finding (generate solutions)***—What are all the possibilities for solving the problem?
- ***Solution finding (select and strengthen solutions)***—What idea will work best?
- ***Acceptance finding (plan for action)***—How will the solution be implemented?

PROBLEM FINDING (THE MESS)

The problem definition/redefinition stage is one of the most important steps of the CPS process. It involves brainstorming all that can be said about a problem situation—factual statements as well as feelings. Basically, the students are advised not to hold back, for everything about the problem should be brought up, whether a student thinks it fits or not.

Next, the students discuss pros and cons and select the single issue or item that "bugs" them most or seems to capture the situation best. The Osborn/Parnes model suggests that the problem statement begin with an "IWWMW . . .?" phrase, or "**I**n **w**hat **w**ays **m**ight **w**e. . .?" For example, if a concern about the unspoiled magnificence of the forestland were the most troublesome aspect for

one group, its problem statement might read, "In what ways might we control the junk that is being dumped in the forest?" If health concerns were the most worrisome facet for another group, it might write, "In what ways might we avoid infestation by dangerous vermin and avoid contagious diseases?"

IDEA FINDING

This is the step where divergent, creative thinking is most important. It begins with students brainstorming dozens of possible remedies for the problem.

Brainstorming works best when groups are small and manageable (e.g., four to six students) and when you allocate sufficient time (e.g., 15–20 minutes). The problem, or mess, should be worded clearly and concisely: "In what ways might our modern society become 'more civilized'?" The students then take a few moments to think silently about the mess and, once the brainstorming starts, propose their ideas freely and openly while a recorder jots them down. The guidelines for brainstorming are:

Generate a large number of ideas. The goal of brainstorming is quantity, for producing a large number of ideas results in a better chance of coming up with a top-notch idea. It helps when children experience "brain drain", or getting all the common responses out of the way before the really creative ideas emerge. Each idea should be written down on a large sheet of paper or white board by a group recorder; a simple list is fine, but a web/map format works well, too. One teacher referred to this phase of brainstorming as "popcorn thinking" and encouraged her students to "just keep the ideas popping out of your head." Think about quantity as being much more important than quality during this phase; students will examine their responses later and determine which ideas are worth further exploration.

No criticism. Criticism is disallowed during this stage of the brainstorming process, for it inhibits the free flow of thought. All types of verbal and nonverbal feedback (eye rolling, face making, groaning, and cynical smiles) must be avoided. Accept every idea that is offered, no matter how outlandish or bizarre it may appear to be at first; everyone must be assured that their ideas are valued and respected. I once heard it said that creativity could be compared to a flower; encouragement makes it bloom while discouragement nips it in the bud.

Encourage "hitchhiking." The children should feel free to latch on to and improve other students' ideas or to use other ideas as a base from which to dream up their own. Combining ideas often results in one idea that is more novel and useful than either by itself.

Encourage freewheeling. The energy of elementary school brainstorming sessions tends to peak and wane. Sometimes, during slow periods, students may exert only nominal effort before announcing, "We're done; we just can't think of anything else." When the momentum begins to plateau or

diminish like this, it is tempting to move on to something else. However, children should display the courage to stay in the battle beyond this point of "idea exhaustion." The most original ideas seem to pop out after students think they don't have anything left. I like to challenge students to "give me three more ideas" after they say they cannot think of anything more. Rather than always equating silence with diminished interest, noninvolvement, or a lack of production, I have found that children often do their deepest thinking about or incubating ideas during periods of silence. If undisturbed, some of the best ideas surface after a period of silence.

As effective as brainstorming can be, it is important to know there are other useful techniques that stimulate creative idea finding. Here are just a few:

- ***Mind mapping.*** This webbing technique can be very useful in helping children organize their thoughts and discover new relationships. Just write the brainstorming topic in the center circle and then jot down brainstormed-words or phrases in the outer smaller circles surrounding the central circle.
  - ***SCAMPER***. A strategy in the form of a checklist that helps students think of changes they can make to an existing product to create a new one. Bob Eberle (1997) developed SCAMPER, which stands for:
    - ***S****ubstitute*— ""Can I replace something or someone with something or someone else?"
    - ***C****ombine*—"What parts or features can be put together to achieve a significantly different product or process?"
    - ***A****dapt*—"What else is already out there that I could use to model, copy, or borrow??" *Modify (or Magnify)*—"Can the item be changed in some way by increasing or decreasing features, adding or removing. . .?"
    - ***P****ut to Other Uses—"What else could this be used for (other than originally intended)?"
    - ***E****liminate—"What features or parts can be removed or simplified?"
    - ***R****earrange (or Reverse)—"Can I reverse or reorder sequences?"
- ***Analogies.*** Analogies offers an approach to creative idea finding that examines what appears on the surface as unrelated phenomena and drawing connections. For example, say that students need to solve the problem of limited parking space in the downtown area of a large city. Instead of stating the problem that way, the students could be told that the problem is one of storing things. Then they would be asked to brainstorm: "How many ways can you think of to store things?" They may come up with ideas such as "Put them in boxes," "Can them," "Pile them up," "Put them on shelves," "Put them in bags," and "Hang them on hangers."

  After the students complete their list, the teacher gives the actual problem to the class. The students examine items from their list to come up

with solutions they may never have considered if presented only with the actual problem. For example, I once presented the parking problem to a group of fifth-graders and was amazed by the interesting parking garage proposed by one group, who elaborated on the idea of "putting things on hangers." Their parking garage was an elaborate system of motorized rails and hangers that picked up cars and stacked them neatly and safely until claimed by their owners.

- ***Morphological synthesis.*** To use morphological synthesis, students combine attributes of two categories in the form of a grid. For example, say that you want to use this technique on *animal bodies* and *animal heads*. Draw up a table listing the animal bodies along the left vertical axis and animal heads along the top horizontal axis (see Figure 5.3). Morphological synthesis will force you to look at many surprising combinations. Idea combinations, or syntheses, will appear in the intersections, or cells, of the table. Either do this randomly (pointing to paper with eyes shut) or select interesting combinations. By mixing an item from each column and row, you will create a new combination of animal parts. For example, I combined a horse with an alligator to invent a new animal that will be used as the central character of a political cartoon. Consider how a political cartoonist might create a cartoon about soil conservation with my "horsagator" as the central character.

SOLUTION FINDING

At this point, students establish criteria for evaluating the ideas selecting the best or most workable. One idea is to have the children examine their lists and agree on the three to five ideas they like best. The children should chat about the pros and cons of each, and then individual group members can assign each of the ideas a score of 0 to 5 points. The scores for each idea are added up, and the one with

FIGURE 5.3 Morphological Synthesis Grid

	giraffe	ape	elephant	boa	alligator	kangaroo	tiger	toucan	iguana
cow									
pig									
chicken									
sheep									
horse									
mouse									
dog									

the highest score becomes the workable idea—the one that will be more fully explored and presented to the whole class as a solution.

During their deliberations, students should address such considerations as, "Will this idea actually solve the problem? Will it create new problems? What are the chances it will work? Is it practical? Will we be able to use it in the near future? What are the strengths and weaknesses? Can any of the ideas be combined into one useful solution?" After narrowing their lists, each group works toward an agreed-upon decision. The ultimate choice might contain one idea or a combination of ideas.

ACTION PLANNING

This step involves expanding the interesting idea or combining interesting ideas into a statement that outlines an action plan that details the steps necessary to implement the solution: "What course of action will we take?" "Does this plan depend on someone else's approval or support?" "What steps are needed?" "Who will do what?" "When must the steps be completed?"

Three major benefits result when students are involved in CPS in dynamic social studies classrooms: (1) Students have greater feelings of self-confidence, self-esteem, and compassion; (2) students undertake wider exploration of

Solving problems is one of the most fundamental skills required throughout one's lifetime; children must practice testing alternative paths and possibilities each day.

traditional content subjects and skills; and (3) students use higher levels of creative invention in content and skills. Therefore, our classrooms must encourage not only the systematic efforts associated with inquiry but also the inventive, intuitive thinking associated with creative problem solving.

Creative problems differ from inquiry problems in that they call for divergent thinking as opposed to convergent thinking, as students search for solutions to problems. Both types of problems, however, are crucial to today's dynamic social studies classrooms in that they encourage children to dig into things, turn over ideas in their minds, try out alternative solutions, search for new relationships, and struggle for new knowledge.

A classroom example of PBL is presented next; it is launched from a problem initiated by the students and is supported by an alert and sensitive teacher, Debra Wood.

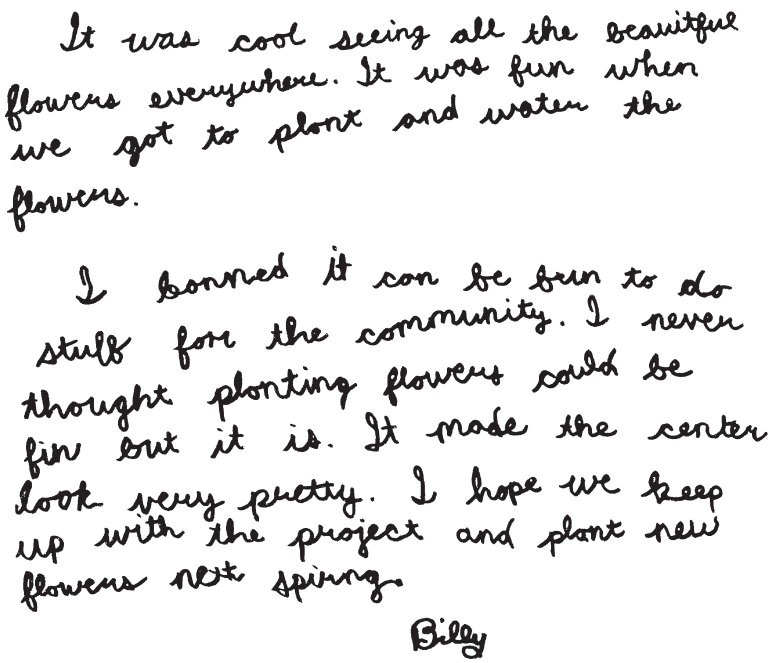
At present, The Clarksville Senior Center has a serene new flower garden—thanks to Debra Wood's fifth-graders. While visiting the center in early autumn to bring a gift of potted chrysanthemums they had started from seeds as a science project a few weeks earlier, the students noticed that an area between the main building and a shed looked desolate and depressing. After returning to the classroom, the students asked Ms. Wood if they could do something to improve the area. After brainstorming several suggestions, the class eventually decided on a flower garden. "A garden is so restful and peaceful," explained Jana. "Yeah," added Vance, "a garden could even bring back memories of World War II victory gardens."

Ms. Wood is an avid gardener and the president of the largest local garden club. She invited several members of the club to visit the class to recommend plants that would need minimal upkeep in their hot and dry climate. The garden club donated the flowers for the children's project and offered advice to the children as they cleaned up the area and planted the flowers. A parent who owned a landscaping company wanted to help, too, and the students dressed the flower area with his donated mulch. The class then solicited other local businesses for help; several chipped in to help as the garden expanded beyond their wildest dreams. A retired carpenter volunteered his time and expertise to make benches. A local lumberyard supplied the gravel and decorative block for a patio where the beautiful wooden benches now rest. An individual donor contributed a birdbath and feeder. In addition, the students took up a collection for a butterfly bush that added to the overall ambiance of the garden.

The garden is wheelchair accessible, a definite plus for seniors with restricted mobility. The senior adults are now responsible for the general upkeep of the garden and have passionately accepted that responsibility. "It gives them something to take pride in," explains Ms. Wood. "Some senior adults like the tranquility of the garden and will sit on the benches reminiscing. Others find the garden a great place to socialize. I'm so glad the students thought of this wonderful idea."

Billy's response to the project is shown in Figure 5.4.

FIGURE 5.4 Student's Reaction Letter


It was cool seeing all the beautiful flowers everywhere. It was fun when we got to plant and water the flowers.

I learned it can be fun to do stuff for the community. I never thought planting flowers could be fun but it is. It made the center look very pretty. I hope we keep up with the project and plant new flowers next spring.

Billy

A Final Thought

It often happens that when the word *research* is mentioned to college students, groans and steely glares accompany the predictable questions: "How long does the paper have to be?" "How many references do we need?" "What's the topic?" Exposing students exclusively to this type of forced research often builds negative attitudes toward the processes of problem solving and inquiry. Written reports on teacher-determined topics using secondary sources not only produce downbeat attitudes in students but also present an unrealistic view of research in the real world. While this kind of research has a place, to present it as the only form of research does students a disservice. We cannot limit elementary school research to such practices either; remember that most elementary school youngsters are natural problem finders. They take pleasure in investigating the mysteries of their world. On their own, they deftly uncover problems of interest—the important first step of research: "Why do farmers cut off the corn and leave behind the lower part of the plants?" "How many ears of corn grow on each corn plant?" What students need at school is to learn the methods through which these questions can be explored. While all the particular problems children bring to school may not be particularly significant, the processes they go

NCSS STANDARDS

This activity aligns with NCSS standards:

- **I.** *Culture*
- **II.** *Time, Continuity, and Change*
- **III.** *People, Places, and Environments*

through and the feelings they gain about themselves as capable researchers are significant. Therefore, authentic research associated with creative problem solving and inquiry processes teaches students that they have the skill and ability to pursue knowledge in a meaningful way and that their efforts have real value now and in the future.

Lifelong learners get their start in elementary school social studies classrooms as teachers arouse curiosity for stimulating questions or problems and propel their students into research to obtain answers. The resulting outcomes lead to the intellectual independence we so often find in self-motivated lifelong learners. Despite their usefulness, inquiry and problem solving are not the only tools suggested for every social studies instructional situation. Teaching social studies requires varied approaches. Eventually, using a single method becomes boring for eager young learners.

References

Bruner, J. S. (1961). The act of discovery. *Harvard Educational Review, 31,* 21–32.

Carson, R. (1965). *The sense of wonder.* New York: Harper & Row.

Christenbury, L. (2010/2011). The flexible teacher. *Educational Leadership, 68,* 46–50.

Dewey, J. (1916). *Democracy and education.* New York: Free Press.

Eberle, B. (1997). *SCAMPER: Creative games and activities for imagination.* Waco, TX: Prufrock Press.

Jakes, D. S., Pennington, M. E., & Knodle, H. A. (2003). *Using the Internet to promote inquiry-based learning.* Retrieved from http://www.jakesonline.org/ibr.htm

Mills, S. C. (2006). *Using the Internet for active teaching and learning.* Upper Saddle River, NJ: Pearson.

National Council for the Social Studies. (2010). *National curriculum standards for social studies: A framework for teaching, learning, and assessment.* Washington, DC: Author.

Osborn, A. F. (1963). *Applied imagination: Principles and procedures of creative problem-solving.* New York: Charles Scribner's Sons.

Parnes, S. J. (1981). *The magic of your mind.* Buffalo, NY: Creative Education Foundation and Bearly Limited.

Penner, L. R. (1991). *Eating the plates.* New York: Macmillan.

Piaget, J. (1969/1970). *Science of education and psychology of the child.* New York: Viking Compass.