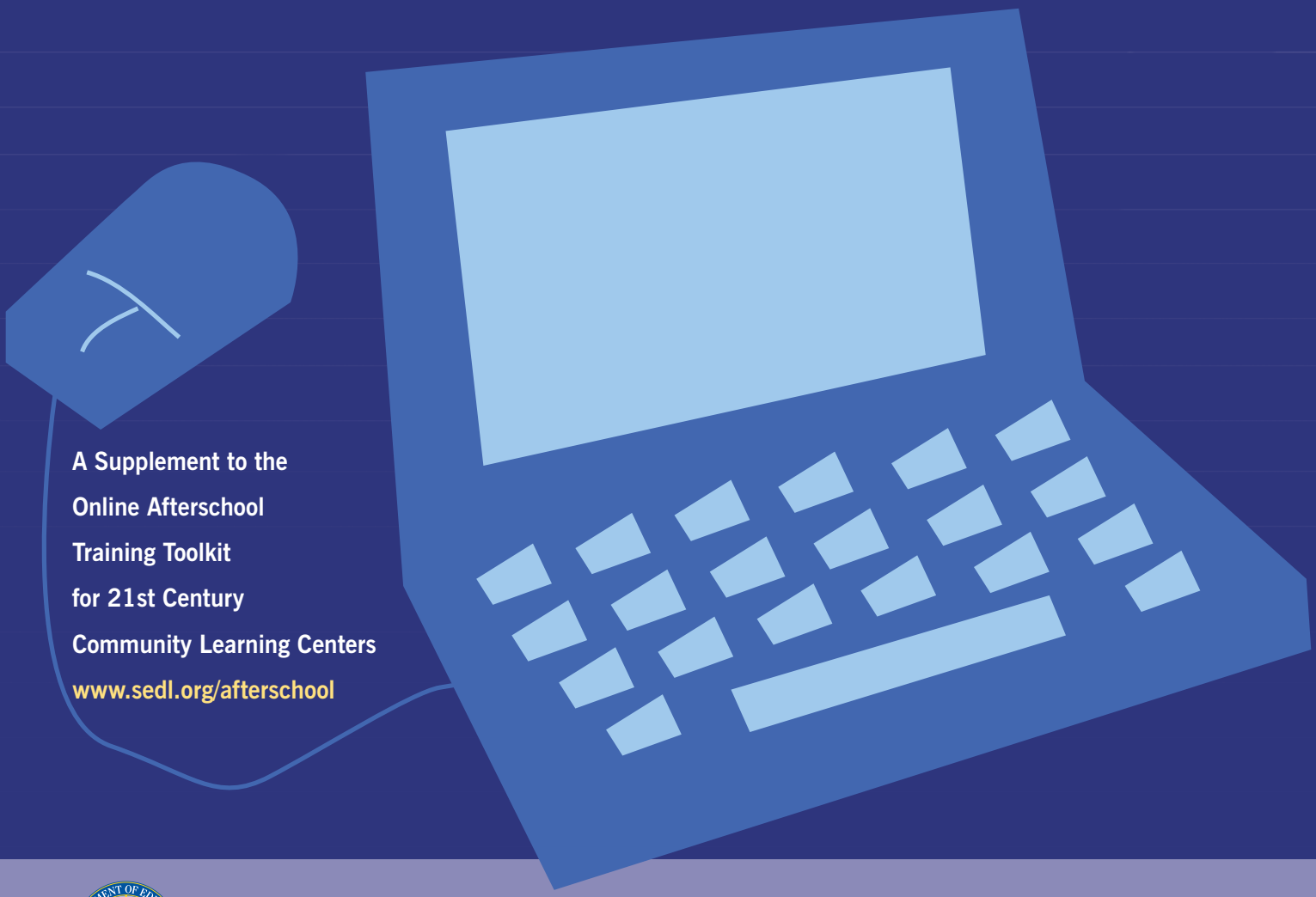
TECHNOLOGY IN AFTERSCHOOL

An Instructor's Guide to the AFTERSCHOOL TRAINING TOOLKIT



A Supplement to the Online Afterschool Training Toolkit for 21st Century Community Learning Centers

www.sedl.org/afterschool

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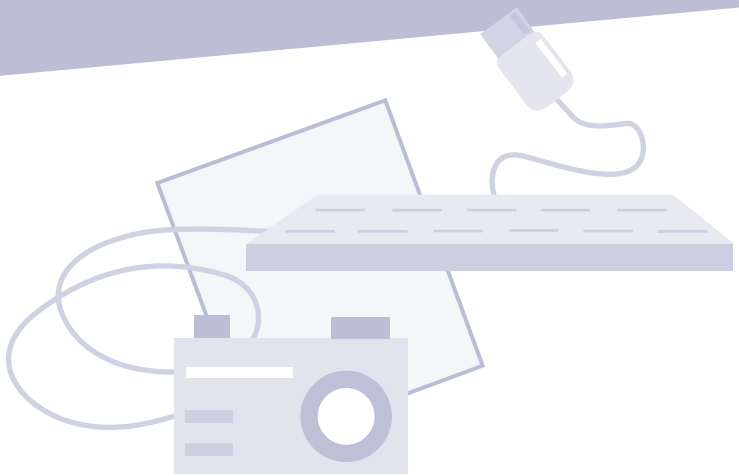
Lesson Overview

Lesson	Grade Level(s)	Duration*	Technology Used *Optional Technology in Italics*	Page
Practice 1: Developing Self-Expression and Creativity				**5**
Planetary Travel Brochure	4–6	4 or 5 sessions	word processing software, Internet, *interactive whiteboard*	8
The Critical Review	9–12	4 or 5 sessions	word processing software, Internet	14
Found Object Orchestra	K–3	3 or 4 sessions	digital cameras, video cameras	20
Digital Storytelling	2–12	7 or more sessions	familiarity with multimedia	26
What Makes Our Community Special?	3–12	6–12 sessions	Internet, digital cameras, word processing or presentation software, *scanner*	34
Practice 2: Gathering and Sharing Information				**43**
The Monarch Butterfly Watch	K–12	7 sessions	Internet, e-mail, *projector*	46
Digital Smiles	4–6	9 sessions	digital cameras, electronic spreadsheets, word processing software	52
Scavenger Hunt for Shapes	1–2; 6–12	3 sessions	digital cameras, presentation software, digital projector	60
Water, Water Everywhere	9–12	several sessions over the course of 2 months	Internet, electronic spreadsheets, *laptop computers, interactive whiteboard*	66
Dance Across the World Wiki	6–8	4 sessions	Internet, registration and use of wikis, word processing and presentation software	72
Practice 3: Finding and Solving Problems				**79**
Hide and Seek With Geocaching	3–12	4 sessions	Internet, e-mail, *projector*	82
Friendship Bracelets	2–5	5–6 sessions	digital cameras, visual learning software like Kidspiration	88
Festival of Bubbles	3–5	3 sessions	electronic spreadsheets	94
What Happened to Mya?	6–8	several sessions	word processing and presentation software, Internet	102
Urban Planning	4–12	6 sessions	Internet, online mapping Web sites, SimCity software	108

Lesson	Grade Level(s)	Duration*	Technology Used *Optional Technology in Italics*	Page
Practice 4: Living and Working With Technology				**113**
Exploring Technology in Careers	6–12	4 sessions	Internet, word processing software, *electronic spreadsheets*	116
Computer Repair and Recycle	6–12	6–8 sessions	old or used computers	122
Building Robotic Machines	4–12	several sessions	LEGO robotics and programming, Internet, *interactive whiteboard*	126
Getting the Word Out	8–12	ongoing	Internet, *blogging software, digital cameras*	132
Creating Podcasts	4–12	5 sessions	Internet, word processing software	136
Practice 5: Learning in Virtual Spaces				**143**
Taking a Virtual Field Trip	K–12	varies	Internet	146
Discovering the World Virtually	K–12	at least 5–7 sessions	Internet, *webcams*	150
Sharing Student Performances	K–12	varies	Internet, videoconferencing software, video cameras	156
Ask an Expert	2–12	ongoing	Internet	162
Visualizing Math With Virtual Manipulatives	K–12	varies	Internet	168
Practice 6: Building Skills and Understanding				**173**
Learning With Puzzles and Games	3–12	1–2 sessions	Internet	176
Learning Concepts With Simulations	3–12	1–2 sessions	Internet, Google Earth software	180
Learning With Tutorials	All	ongoing	Internet, tutorial software	190
Engaging Readers and Writers With Interactive Whiteboards	All	1 session	Internet, interactive whiteboard	194
Using Logic Games With Interactive Whiteboards	All	1 session	Internet, interactive whiteboard	200

* Each session will last approximately 45 minutes.



Introduction

The Afterschool Training Toolkit

If you work in afterschool, you most likely know the challenge of offering afterschool academic enrichment that will boost student performance during the regular school day while making sure activities are engaging enough to keep students coming back. Through a contract with the U.S. Department of Education, the National Partnership for Quality Afterschool Learning has developed tools to help you meet this challenge. National Partnership staff visited 53 afterschool programs, nationwide, that had evidence suggesting they had a positive effect on student achievement.

Based on this research, the National Partnership developed the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits), an online resource that is available to afterschool professionals to help them learn how to offer engaging educational activities that promote student learning. The toolkit is divided into sections that address six content areas: literacy, math, science, the arts, homework help, and the content area for this guide, technology. Like the other content areas in the toolkit, technology is taught through promising practices, or teaching techniques with evidence suggesting they help students learn important academic content.

The six promising practices in afterschool technology identified in the Afterschool Training Toolkit are as follows:

- *Developing Self-Expression and Creativity*
- *Gathering and Sharing Information*
- *Finding and Solving Problems*
- *Living and Working With Technology*
- *Learning in Virtual Spaces*
- *Building Skills and Understanding*

When used with the Afterschool Training Toolkit, the lessons in this instructor's guide will help you master these promising practices. Once you become proficient at these practices, you should be able to use them to develop other technology lessons.

This instructor's guide will help you

- understand how to use the technology section of the Afterschool Training Toolkit;
- use technology to offer fun lessons that help students learn in afterschool;
- motivate students to participate in afterschool; and
- use the lessons to become a more effective afterschool instructor.

The Role of Technology

Before you begin, you should know that this instructor's guide is *not* a manual for using different types of technology or starting an afterschool technology program.[1] You do not need to be a technology expert to use this guide. In addition to the lessons on promising practices, we have a number of helpful resources at the end of this guide. The "Pre-Project Planning Inventory" will help you accommodate your particular afterschool situation and plan for the best possible lesson. In addition, you will want to take time to review policies about using copyrighted materials on the Internet (http://memory.loc.gov/learn/start/cpyrt/) and Internet safety practices (www.netsmartz.org/resources/).

How to Use This Instructor's Guide

This guide will help you master promising practices in technology for afterschool through the following steps:

- Watch video clips to see real afterschool programs using the promising practices from the National Partnership's online Afterschool Training Toolkit.
- Teach the sample lessons included in this instructor's guide to your students.
- Integrate technology into student activities in afterschool.
- Reflect on the student lesson.

Video Clips

The Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/) includes video segments taken from outstanding afterschool programs across the United States. Watching these video segments allows you to observe afterschool instructors in action as they use promising practices in technology. Take notes on what you see, and think about ways that you can use these practices in your afterschool program.

[1] There are many resources available on research conducted on technology in afterschool and how to set up afterschool technology programs. See the online resources in the technology section of the Afterschool Training Toolkit, including "About Technology in Afterschool," available at www.sedl.org/afterschool/toolkits/about_toolkits.html?tab=technology.

Lessons

After you watch each video that illustrates a practice, you will find five sample lessons that use the same practice. You can teach as many of these lessons as you think are appropriate to your students, depending on their grade levels and technology skills and time available in your afterschool schedule.

Reflection

After each lesson, you will find a series of questions addressing the preparation, student engagement, academic enrichment, and classroom management of that lesson. The purpose of the reflection is to allow you to be intentional in your instruction—to think about what aspects of a lesson worked well and what changes you might want to make for future lessons. Reflection is an important part of becoming a successful instructor and will help you apply what you learned from one lesson to another.[2]

The following is an example of how a teacher might answer the reflection questions after leading a lesson where students use technology to research planets and create planetary travel brochures.

Reflection [Sample]

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Teaching technology activities requires different preparation than the other subject areas I have taught. It wasn't necessarily more difficult, but it seemed like there were more logistics involved. I had to make reservations to use the computer lab, make sure that we had all of the correct software, and make sure that I knew how to use it.

I also spent some time looking at some of the resource Web sites ahead of time, which made things go much more smoothly. Of course, the one day that I didn't make sure that everything was set up ahead of time was the day that we had Internet problems, so I definitely learned my lesson in terms of planning ahead.

[2] McEwan, E. K. (2002). *Ten traits of highly effective teachers.* Thousand Oaks, CA: Corwin Press, Inc.

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

I tried to call on as many students as possible during the group part of the activity to make sure everyone was involved. When students were working on their brochures, I circulated the room to see if everyone was working. I noticed that the students were definitely more engaged when they were able to participate and do something, rather than just listen (like they did with the story).

Overall, I was satisfied with the level of student engagement. To keep students more involved during the story, I need to let them participate more (answer questions and comment on the story). When students begin researching and making brochures, I will check to make sure everyone understands the activity.

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

This lesson supported science (with the research on the planets) and literacy (with the story and students writing the content for their travel brochures). I would keep a vocabulary list on the chalkboard so that students could remember some of the terms we use and incorporate them into their vocabulary. I would also try to time the activity to take place during or shortly after a time when students have studied the planets in the regular school day so that they can use that knowledge in the activity.

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Most of the time students were focused on the activity, and I think working in pairs was helpful. If I do this activity again, I will try to get students to work with someone they don't usually work with so that they're not always working with their buddies. I will also try to make sure that students with limited Internet and computer skills work with a partner who has more experience and can help.

Practice 1

Developing Self-Expression and Creativity

What Is It?

Developing Self-Expression and Creativity is an instructional practice that involves using technology tools to produce a variety of creative works. Activities usually begin with a central theme or content area focus—for example, literacy for storytelling, journals and publications; science and math for reports; or arts through digital images and video production. Students work together in groups while the instructor guides the activity and assists them. By completing these technology-enriched activities, students develop and enhance their technology skills.

What Is the Content Goal?

The goal of this practice is to enhance students' learning, self-expression, and creativity with projects and products (e.g., writing and publishing for the Web). Students develop communication skills by asking questions, expressing opinions, constructing narratives, and writing for an audience. They build their technology skills by using a range of media, including text, still images, audio, and video.

What Do I Do?

Decide whether the project or product will focus on literature, science, math, art, or a broader theme. Consult with the school-day teacher to see if he or she has ideas for an activity that will enrich a content area.

Work with students to decide on an appropriate project or product. Remember to tap students' interests, and include students in planning. This will increase their sense of ownership and their participation in the activity. Form small teams or groups if you think it is appropriate for the activity and your students' age level. As the project progresses, make any necessary adjustments and look for extension opportunities. When the project or product is complete, evaluate and plan the next one.

Afterschool programs have had success with a wide range of projects that connect to many subject areas and interests, including the following:

- Writing projects such as poetry or journalism
- Video and multimedia projects that feature performing arts, writing, design, editing, and animation (see example video on this page)
- Photography (digital and other formats)
- Music composition, recording, production, and engineering
- Documenting performing arts performances or presentations
- Technical aspects of the performing arts such as set design or lighting

Remember that assessing student skills, time requirements, and computer resource needs is part of the planning process. Consult the Pre-Project Planning Inventory on page 205.

Why Does It Work?

Students build independent thinking skills, gain ownership, and learn from one another when they are engaged in creative challenges.

Getting Started

Go to the *Developing Self-Expression and Creativity* practice found in the technology section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/technology/pr_developing.html) and click on the video.

Use the before, during, and after writing prompts to write down your ideas on how you might involve your students in script writing and movie making.

BEFORE YOU WATCH THE VIDEO, write down what you already know about students using technology for self-expression and creativity.

DURING THE VIDEO, consider the following:

How does the instructor work with the students to lay the groundwork for the activity and get them started?

What academic skills like reading, math, etc., are students reinforcing while they participate in the activity? Be sure to give specific examples.

AFTER YOU WATCH THE VIDEO, write what modifications you might need to make to teach this lesson in your own class.

Remember that assessing student skills, time requirements, and computer resource needs are also part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

Planetary Travel Brochure

Integrate science, the arts, language arts, and technology as students create a travel brochure for one of the planets. After researching all the planets online and taking notes on a planet chart, students select one planet to encourage people to visit. They write the text using word processing software and create illustrations using pencils, markers, or crayons.

This is an interdisciplinary lesson that combines the arts and technology. To learn more about this lesson, you can view it as part of the Afterschool Training Toolkit for the arts at www.sedl.org/afterschool/toolkits/arts/pr_integrating.html.

Grade Level(s):

4–6

Duration:

Four or five 45-minute sessions

Technology Prerequisites:

Student: Basic computer skills, including keyboarding and Internet

Teacher: Basic computer skills, including word processing, Internet, and whiteboard

Student Goals:

- Understand basic elements of the visual arts
- Understand how the visual arts can be used to communicate ideas
- Learn how to use expressive features and visual organization to communicate ideas
- Learn how to use word processing software to create a brochure

Curriculum Connection:

Science and language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

An afterschool class of 14 students gathers around the instructor as he or she reads a story about a teacher who magically takes her students into outer space where they have lots of adventures as they travel to all the planets. The afterschool students love the book, its illustrations, and its subject matter, outer space. After listening to the story, the students use the Internet to research planets and the solar system. They then use word processing software to create travel brochures for planets advertising trips like the one the students in the story took in their magic school bus, decorating the printed brochures with yarn and glitter.

What You Need

- ❒ Copy of *The Magic School Bus: Lost in the Solar System* by Joanna Cole (New York: Scholastic Press, 1992)
- ❒ Teacher computer that can project onto a large screen or interactive whiteboard
- ❒ Overhead projector, if interactive whiteboard is not available
- ❒ Student computers, one for each pair/team, with Internet access
- ❒ Planet chart for each student (www.sedl.org/afterschool/toolkits/arts/pdf/ast_art_planetary_travel.pdf)
- ❒ Planet chart downloaded and ready to project onto the screen or interactive whiteboard; also can be printed on a transparency for use with an overhead projector. In either case the primary goal is for the students to watch their contributions (facts) complete the chart.
- ❒ Drawing materials such as pencils, crayons, markers, etc.
- ❒ Arts and crafts materials such as yarn, string, glitter, glue, etc.
- ❒ Travel brochures from various locations

Getting Ready

- Bookmark on teacher computer and student computers the following Web sites:
  - StarChild (http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html)
  - National Geographic Solar System (www.nationalgeographic.com/solarsystem/splash.html)
  - Microsoft Online Brochure Templates (http://office.microsoft.com/en-us/templates/CT101043031033.aspx)
- Read *The Magic School Bus: Lost in the Solar System* by Joanna Cole and think about how you will use the illustrations to review the basic elements of the visual arts, such as color, shape, and line.
- Practice using the brochure templates at Microsoft Online. Print out mock-ups that you have done with text only, leaving room for illustrations. Be prepared to show your students this process using a projector.
- Use The Artist's Toolkit (www.artsconnected.org/toolkit/explore.cfm) to refresh your understanding of the artist's use of color, shape, and line.

Sessions 1 and 2: Lost in Space

What You Need

❒ Planet chart and projection device

❒ Student computers for planet research

❒ Adult or older student volunteer to help with online research

What to Do

- Read aloud *The Magic School Bus: Lost in the Solar System* by Joanna Cole. Use the illustrations in the book to review the basic elements of the visual arts (color, shape, line).
- Use the transparency of the planet chart with an overhead projector or project the chart from your computer onto a screen or interactive whiteboard to organize information students will find about the planets. Hand out a copy of the chart to each student.
- Divide the class into pairs or small groups and assign a planet to each. Students are to use the Web sites you've bookmarked to research their planets. Ask them to record the following about their planet in the appropriate spaces on their planet charts:
  1. Size
  2. Distance from the sun
  3. Rotation period
  4. Revolution period
  5. Composition (rock or gas)
  6. Appearance
  7. Number and names of moons
  8. Special features
- When students have finished researching their planets, fill in the planet chart and discuss what students learned about the planets.

Sessions 3 and 4: Planetary Travel

What You Need

❒ Teacher computer with projector and Internet access

❒ Student computers, at least one for every two students, with Internet access

❒ A printer

❒ Drawing and craft materials

❒ Adult or student volunteer(s) to help with word processing of brochure

What to Do

- Review the story and planet chart. Ask students to consider which planet they would visit if they could and why they would choose that planet.
- Show sample travel brochures and explain that they will be creating travel brochures for their selected planets. Briefly discuss techniques used in brochures to create excitement or interest in a particular destination.
- Introduce elements of the visual arts, such as color, shape, and line. Discuss how these elements may be used to convey information about their planets (e.g., a color palette to represent the different planetary temperatures, curved lines to depict rotation, etc.).
- You may want to take your students online to the Artist's Toolkit (www.artsconnected.org/toolkit/explore.cfm) to explore the elements of art in more detail.
- Project Microsoft Online's templates for brochures, and explain to your students that for this project they will use the templates only for the brochure's text. Using one of the templates, show how simple it is to type new text into the template. They will need to delete the graphics from the templates so that they can add their own drawings and decorations after they print them out. Each student will create his or her own brochure, but you might want students to work in pairs to assist each other in using the technology.
- Have students go to their computers and bring up the template Web site, which should be bookmarked or already up on the screen.
- After deciding which template to use, each student will print out a copy of the template so that he or she can plan the brochure's text and illustrations.
- Once a student has decided what text to use and where it will go on the brochure, he or she should enter that text, keeping in mind that the purpose of a travel brochure is to excite the reader enough to visit that place.
- Caution students not to put too much text on their brochures because they want to leave plenty of room for illustrations that reflect their understanding of the elements of art—color shape, and line.
- After printing out their brochures, the students use color, line, and shape to create illustrations that convey a feeling or information about the planet and entice people to travel there.
- Ask students to present their brochures to one another in pairs or small groups and explain how their use of line, color, and shape as well as text conveys information or feeling about their planet. If students are receptive, have them share their brochures with the class.

Extend

- Have students create an advertising campaign for each planet, including a radio/TV commercial, billboard, and/or magazine ad.
- Have students make another brochure but this time use technology to create the graphics as well as the text.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?


Venus
Mercury
Earth
Jupiter
Mars
Saturn
Uranus
Milky Way
MANTLE
Classification

Lesson 2

The Critical Review

After talking to your students' day-school English teachers, decide on a theatrical performance for your students to view, either live or recorded, that will enrich some aspect of their current studies. In this lesson, students read reviews of plays or television shows to that they can become familiar with the format. and then write their own reviews, comparing them to the work of critics.

This is an interdisciplinary lesson that combines the arts and technology. To learn more about this lesson, you can view it as part of the Afterschool Training Toolkit for the arts at www.sedl.org/afterschool/toolkits/arts/pr_thinking.html.

Grade Level(s):

9–12

Duration:

Four or five sessions of 45–60 minutes (performance viewing time not included in this estimate)

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills

Student Goals:

- Understand the purpose and role of theatre criticism
- Learn to analyze, interpret, and critique a live theatre performance
- Learn to develop a framework for criticism and write a review of a performance

Curriculum Connection:

Language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

A class of afterschool students attends a live theatrical performance. Some students loved the performance, while others wished it had been livelier. Back in the classroom, students discuss what they saw and heard and try to decide if they would recommend that their friends see the performance. They write a critical review of the performance and then compare their reviews to what the professional reviewers thought and wrote.

What You Need

- ❒ Access to a live theatre performance or a video/DVD of a performance
- ❒ Audio visual equipment if viewing a video or DVD
- ❒ Student computers with word processing software (enough for each student to have his or her own computer)
- ❒ Biographies about the playwright
- ❒ Articles about the play
- ❒ Sample theatre reviews

Getting Ready

- Collect samples of theatre reviews from the Internet, newspapers, or magazines.
- Review the major elements of a theatre production (acting, directing, script, stage, set). The script is the blueprint from which the director builds the production. The director coordinates the actors, script, and set so that the product on stage becomes art. But the audience is what separates theatre from film and television; the audience impacts every performance and can change a performance with its reactions and expectations.
- Review the major elements of a theatre review (description, analysis, interpretation). Description refers to summarizing events of the performance (e.g., "Each scene was acted out accompanied by a series of images"). Analysis takes the description and puts it in context (e.g., "This technique is popular in restoration theatre"). Finally, interpretation builds on the description and analysis, and allows room for a personal opinion (e.g., "This made it hard to connect with the characters").

Session 1: Role of the Theatre Critic

What You Need

❒ One computer with projection capabilities and Internet access

❒ Student computers with examples of theatrical reviews bookmarked and ready to view

❒ If applicable, a Web site bookmarked for students to read about the playwright

❒ Paper and pencils or pens for note-taking at the performance

What to Do

- Discuss the role of criticism in theatre, reviewing the major elements of theatrical production and review.
- Give students time to read about the playwright.
- Help students prepare for the performance by reviewing the elements of theatre: script, acting, direction, set, and stage.
- Distribute paper and pencils or pens to use for note-taking during the performance. Have students write the elements of theater on their paper so that they will be ready to write about each theatrical element during the performance.

Session 2: Watching a Performance as a Critic

What You Need

❒ Chart paper to record ideas

❒ Students' notes of performance

What to Do

- Guide students in a critical discussion of the work they viewed, organizing the discussion around a critical framework such as description, analysis, and interpretation.
- Write down students' comments and categorize them under description, analysis, or interpretation. You might ask, for example, the following questions:
  - What happened? Describe the plot and any aspects of the performance.
  - Why do you think the author or playwright included these things? What do they tell you about the playwright? What do they reflect about the period when the piece takes place? What do you think the desired effect was?
  - What do you think of the things you've described and analyzed? How did they make you feel? Did the piece have the desired effect on you as a viewer?
- Beginning critics may struggle to distinguish analysis from interpretation. Encourage students to practice separating analysis rooted in cultural or historical meanings from their own personal impressions.
- Ask that they refer to their notes for specific details during the discussion and as they write their reviews (but collect the notes to hand back to the students at the next session).

Sessions 3 and 4: Writing a Critical Review

What You Need

❒ Student computers with word processing software

❒ Students' notes of the performance

What to Do

- Ask students to assume the role of a newspaper theatre critic whose word limit is 400 and whose deadline is noon the day following the performance.
- Have students write their reviews using the word processing software on their computers. Remind them to use spell check but not to count on it for proofreading the document. Make sure they know how to use the word count feature on the software (typically found under the "Tools" menu in Microsoft Word).

Session 5: Reflecting on Criticism

What You Need

❒ Copies of reviews of the performance your students saw

What to Do

- Ask students to pair up and read their reviews to each other. Reviews should reflect thoughtful analysis of a performance, including constructive criticism.
- Read aloud an actual published review of the performance you saw. If you saw a live performance, you should be able to find a review in a local newspaper. If you saw a recorded performance, you should be able to find a review online.
- Have students compare their reviews to those you found in newspapers or online? Did they agree with the reviewers or have different views?

Teaching Tip

Journalism and Page Limits

Students might be familiar with having a minimum page or word count for a writing assignment, but they might be accustomed to having a maximum page or word count. Students who are interested in writing or journalism as a career might be interested in knowing more about this. Ask them why they think there might be a word limit for an article and what else an editor might have to consider when including several articles in one publication.

Extend

Talk to your students' day-school English teachers again to see if your students might be able to share what they have learned through this exercise in their day-school classes. Perhaps they could assume the role of guest speakers in their English classes to review the performance and connect it to the class reading of the play.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Found Object Orchestra

This lesson is one example of how you can implement the practice of building skills in the arts. In this activity, students use classroom materials to create musical instruments. Technology is integrated into the lesson when students take digital photographs and make a video recording of their instrument creation and the resulting music.

This is an interdisciplinary lesson that combines the arts and technology. To learn more about this lesson, you can view it as part of the Afterschool Training Toolkit for the arts at www.sedl.org/afterschool/toolkits/art/ex_object_orchestra.html.

Grade Level(s):

K–3

Duration:

Three or four 45-minute sessions

Technology Prerequisites:

Student: None

Teacher: Basic computer skills, including some familiarity with digital cameras and video cameras

Student Goals:

- Learn to analyze various musical pieces
- Understand musical concepts such as tempo (how fast or slow the sound), dynamics (how loud or soft the sound), and pitch (how high or low the sound)
- Learn to improvise simple expressive rhythms (beat) and melodic variations (tune) on musical instruments
- Participate in producing a recording of their music
- Understand that the use of technology includes responsible and ethical behavior

Curriculum Connection:

Literacy and the arts

National Educational Technology Standards Connection:

1: Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

The room is full of joyful, productive noise. Students have used everyday objects like boxes, cans, rocks, and pencils to create an orchestra and taken digital pictures of their work. They have listened to musical recordings and discussed the music. Now they are making their own music. After a few practice sessions, they videotape their performance so they can share their music with family and friends.

What You Need

- ❒ *Max Found Two Sticks* by Brian Pinkney (New York: Aladdin Paperbacks, 1997)
- ❒ Various sound- and instrument-making materials, such as dry pasta, rice, beans, tissue paper, cardboard tubes, and cellophane
- ❒ Paper plates and cups, boxes with lids, cans, plastic bottles
- ❒ Stapler, glue, tape, rubber bands
- ❒ CDs (or MP3s—digital audio files) with excerpts of the following suggested classical music pieces:
  - "Night on Bald Mountain" by Modest Mussorgsky
  - "Moonlight Sonata (Piano Sonata No. 14)" by Ludwig van Beethoven
  - "Stars and Stripes Forever" by John Phillip Sousa
- ❒ Digital cameras and video camera (Many digital cameras can record short video clips. These can also be used.)
- ❒ Adult or older student volunteers to help with making instruments

Getting Ready

- Compile excerpts of the suggested classical music pieces.
- Read *Max Found Two Sticks* and consider how you will engage students in your read-aloud. Watch the video on read-alouds in the literacy section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/literacy/pr_read_aloud.html) for ideas.
- Review the basics of the musical concepts to be discussed.
- Create your own musical instrument to demonstrate.
- Familiarize yourself with the digital camera and video camera. If you're not comfortable leading this part of the lesson, ask someone to help you. A middle or high school student aide would be fun for your class.

Session 1: Making Musical Instruments

What You Need

❒ Copy of *Max Found Two Sticks*

❒ Instrument made from objects found in the classroom

❒ Materials for instruments

❒ Volunteer(s) to help students make their instruments

What to Do

- Read *Max Found Two Sticks,* a book about a boy who uses two sticks to beat out the rhythms of the city around him.
- Discuss how musical instruments can be found all around. For instance, Max used sticks. Primitive people used shells and animal horns.
- Show students the instrument you made, and ask them what other materials found in the classroom would be good for making instruments.
- Have students use the materials provided and available in the classroom to create musical instruments.
- Students do not have to make an instrument if they can use objects or materials in the classroom to make sounds (e.g., a zipper on a backpack or a desktop to drum).
- Take digital photographs of students working or making a video recording of the activity.

Session 2: Listening to and Creating Music

What You Need

❒ Classical music examples that show specific and easily recognizable emotions

❒ Students' instruments

❒ Volunteer(s) to help with technology and classroom management

What to Do

- Listen to brief excerpts from classical music pieces to hear how orchestras play various emotions. For example, "Night on Bald Mountain" by Mussorgsky sounds angry; "Moonlight Sonata" by Beethoven sounds sad; and "Stars and Stripes Forever" by Sousa sounds happy.
- Discuss tempo, dynamics, pitch, and rhythm. Consult the Glossary of Musical Terms on ClassicalWorks.com for background as needed.
- Have students use their instruments to express various emotions.
- Play additional classical music pieces to demonstrate emotion in music, and allow students to use their instruments to investigate musical concepts in a hands-on way.

Sessions 3 and 4: Recording Student Music

What You Need

❒ Instructor computer

❒ Video recorder or digital camera with capacity to record short video clips

❒ Adult or older student to help with recording

What to Do

- Have students play for the rest of the class what they will play on the recording.
- As each student plays his or her "emotion," have the rest of the class try to determine what emotion the performer intends.
- Remind the students of how the classical music conveyed emotion using the musical terms *rhythm, tempo, pitch,* and *tempo* as you talk.
- Once students have had time to practice, make a video recording of their performance.

Extend

- Save the video recording and share it at your afterschool program's next open house.
- Have students use word processing software to create advertisements for an upcoming concert.
- Combine the music and pictures into a PowerPoint presentation or video, and make an audio recording of the performance to serve as the soundtrack.

Teaching Tip

Finding Music Online

Many classical pieces can be found online. The Music Library at the Garner Museum (www.gardnermuseum.org/music/library.asp) is an excellent resource. If you download music from the Internet, remind your students of the legal and ethical responsibility that comes with this service.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 4

Digital Storytelling

Digital storytelling is a form of self-expression in which students use technology instead of the traditional pen and paper to tell a tale. Depending on the technology you use, the opportunities are nearly limitless. Digital stories can include digital photos, video, background music and other audio clips, and even animation. In this activity, students complete a digital story about themselves, "The Story of Me."

Grade Level(s):

2–12 (This project can range from basic to quite complex depending on the level of technology skill and sophistication of you and your students.)

Duration:

Seven or more sessions of 45–60 minutes

Technology Prerequisites:

Student: Basic computer skills

Teacher: Computer skills, including the use of multimedia

Student Goals:

- Develop communication skills by learning to construct narratives and write for an audience
- Increase computer skills using multimedia software that combines a variety of media, including text and still images

Curriculum Connection:

Language arts, the arts, and social studies

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

An afterschool instructor gathers a class of 20 students to work on a digital storytelling project, "The Story of Me." Students not only get to know each other better but also share an appreciation of each other's cultures by creating visual presentations that tell their stories. They take photographs with digital cameras, learn to use scanners to incorporate original artwork, and perhaps even add music, narration, or video to their stories.

What You Need

❒ Teacher computer with projector and Internet access

❒ Student computers with Internet access

❒ Digital camera(s) (If you do not have access to digital cameras, you can use regular film cameras and scan the photographs.)

❒ Word processing software and/or PowerPoint, Keynote (for Macs), or other presentation software.

- For help choosing the appropriate software, see Table 2 at www.coe.uh.edu/digital-storytelling/course/SITE2005-article.htm.
- For step-by-step instruction on how to create a digital story using PowerPoint, go to www.cyberbee.com/powerpoint.html.

❒ Scanner

❒ Copies of student handout (Handout 1)

❒ Template for story (optional)

- Depending on the level of technology sophistication of your students, you may want to use the questions on the "All About Me" handout to create an electronic template.
- The electronic template can then be downloaded onto student computers so they can enter their dialogue, photographs, etc.

Getting Ready

- Familiarize yourself with the digital storytelling process by working through at least one of the following tutorials:
  - www.umass.edu/wmwp/DigitalStorytelling/How%20to%20Create%20a%20digital%20story.htm
  - www.infotoday.com/MMSchools/jan02/banaszewski.htm
  - www.coe.uh.edu/digital-storytelling/gettingstarted.htm
- Familiarize yourself with the multimedia software programs that are installed on your student computers.
- Review the following Web sites and select two or three examples of digital storytelling appropriate for your students' age group:
  - www.creativenarrations.net/site/storybook/index.html
  - www.mobilelearninginstitute.org/projects/TX/Dallas/YMCA_AM_Summer06/index.htm
  - www.kqed.org/topics/education/educators/calstories-contest.jsp

  As you review the digital storytelling Web sites, you may find ideas that will help you better facilitate this lesson. Bookmark for easy access the examples of digital stories you've selected to show your students.

Session 1: Introduction

What You Need

❒ Teacher computer with projector and Internet access

What to Do

- Introduce digital storytelling with a trip down memory lane. Ask students what stories they first remember hearing, who their favorite storyteller was, what their favorite stories were, etc. Lead the discussion to digital storytelling.
- Use your computer to project examples of digital stories.
- Tell the students that they will be telling their own stories digitally through pictures, music, audio, and video.
- Modify this lesson as necessary depending on the age level and technology experience of your students.

Sessions 2 and 3: Preparing Their Stories

What You Need

❒ Teacher computer with projector and Internet access

❒ Student computers

❒ Digital cameras

❒ Handout for story

What to Do

- Distribute the handout, explaining that students will be adding text and taking photographs to illustrate their stories. Brainstorm as a class what photographs students might want to include to better tell their stories.
- Ask students to take a few minutes and complete their handouts keeping in mind that they will be using these as a guide for their visual presentations.
- After reviewing proper use and care of cameras, distribute them to students. Set a deadline for when students will need to have finished taking photographs.

Sessions 4 and 5: Creating Digital Stories

What You Need

❒ Students' photographs available in digital format and stored somewhere they can access them during the lesson.

❒ Teacher computer with projector

❒ Student computers

What to Do

Preparation

- Once students have finished taking photographs, determine what you need to do to make the electronic images accessible to students. If they have used a film camera, take the film to be developed, requesting the pictures be made available on a CD.
- If students used digital cameras, once you have downloaded the photographs to a computer you can store them on the computers themselves or on a portable storage device so students will be able to access them.
- Make sure all computers are working properly and have the correct presentation software.
- If your students are using an electronic template, have it installed on their computers. You may want to save it as a back-up for students who have trouble with presentation software.

Instruction

- Through a show of hands, determine students' familiarity with the software you are using for the digital story. Demonstrate how to add text and insert images into the template. Once most students seem to understand how to do this, you can let them work on their projects.
- As students finish with text and images, encourage them to take stories further with video, music, and sound clips.
- Some students may have an idea of an image they want but don't have as a photograph. Show them how to search the Internet and download images to place into their stories.

Session 6: Sharing Stories

What You Need

❒ Teacher computer with

❒ Students' digital stories

What to Do

- Ask the students to share their stories with classmates.

Session 7: Evaluate

- Discuss as a class what the students found to be most interesting about digital storytelling compared to traditional storytelling. Encourage a comparison of the two types of storytelling. Keep comments positive and supportive.
- Prepare a rubric for students to use to evaluate their projects. Check out rubrics at www.ncsu.edu/midlink/ho.html.

Teaching Tip

Students will most likely need to take some of the photographs at home and during their free time. You will need to decide ahead of time how long you will want to allow students to have the cameras. If students cannot take cameras home with them, consider the following options:

- Ask students to bring in photographs and drawings to scan.
- Revise the lesson so that it does not require photographs from home.

Extend

- The students can share their projects with parents at an afterschool family night.
- Students may want to explore their community's history through digital storytelling, incorporating interviews, video, and photographs.
- Talk to day-school teachers to see if they are studying a topic that might be enhanced by digital storytelling.

Additional Resources on Digital Storytelling

- Digital Storytelling in the Language Arts Classroom
  http://cs2.cust.educ.ubc.ca/csed/400/csed_readings/display%2024.pdf
- Cookbook and Traveling Companion: A Guide to Digital Storytelling
  http://testingrange.com/docs/digistory.pdf
- Digital Storytelling Resources
  www.techteachers.com/digitalstorytelling.htm

Handout 1: The Story of Me

Think about people, places, and things that have been important in your life. Consider the following questions before you write your script for "The Story of Me."

Name (first name only) _____

Who's in my family? _____

_____

What do I like to do? _____

_____

_____

Where do I like to go? _____

_____

What do I like to read? _____

Who are some people who are important in my life? Why? _____

_____

_____

_____

What makes me happy? _____

_____

What are some of my family's traditions? _____

_____

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

What Makes Our Community Special?

In this lesson[3] students define *community* and then examine different aspects of a chosen community (for example, their classroom, school, or neighborhood). Working in small teams, students use technology tools to discover and document unique features of their chosen community and to collaborate on a final product—a digital story, newsletter, electronic presentation, or Web site.

Grade Level(s):

3–12

Duration:

Six to twelve 45-minute sessions

Technology Prerequisites:

Student: Basic skills using the Internet, digital cameras, electronic spreadsheets, and electronic publishing or presentation applications helpful but not required

Teacher: Basic skills using the Internet, digital cameras, electronic spreadsheets, and electronic publishing or presentation applications

Student Goals:

- Work together collaboratively on a learning activity, using multiple technology tools
- Gain or enhance technology skills that can be used to communicate with an outside audience
- Integrate several academic areas, such as math, literacy, history, and art, into a multidisciplinary unit

Curriculum Connection:

Social studies and language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

[3] Adapted from the *Active Learning with Technology Portfolio: Active Learning Environments.* SEDL: Austin, Texas.

Imagine This!

Sixth-grade afterschool students have been asked to create an electronic presentation about their community. As a group, they discuss the different aspects of their community. What makes it special? Are there any festivals or commercial areas that they think are noteworthy? Are there famous people in the community or a community history worth noting? They discuss where they can find information and decide that they need to check the Internet, visit their school library, take some digital pictures, and interview citizens in the community. They also discuss and research the computer software they will need to produce their presentation. They identify a team leader and the different roles and responsibilities of each member. They decide what piece they want to work on and break out into smaller groups. They plan and decide on a time line and develop their project.

What You Need

- ❒ Brainstorming/note-taking sheets (Handout 2)
- ❒ Computer with Internet access
- ❒ Computer with graphing software or electronic spreadsheet and presentation applications
- ❒ Digital camera(s)
- ❒ Print resources about the community (can be found in the local library or visitors bureau)
- ❒ Instructions and student role assignments for each activity station (Handout 3)

Getting Ready

- Consider the community students might explore. Will they be creating a presentation about the classroom, school, neighborhood, city, or larger community? This will help determine needed resources.
- Determine how students will be grouped. Create student role assignments and instructions for each station.
- Plan for and reserve the necessary technology and verify that all technology is working. Practice with digital camera and check batteries.

Teaching Tip

One of the great things about this activity is its flexibility. Here are a few things to ask yourself before you get started:

- How familiar are students with the technology I plan to use? How much time will I need to spend showing them how to use it?
- How much freedom do my students have to acquire photographs of people and places that are far from the school? Will they be able to take the photographs themselves, or will we have to scan photographs or acquire them through Internet searches?
- How will we acquire information about the culture and history of our community online? Will I need to arrange for the students to visit the library? Will I need to bring in outside resources from the chamber of commerce or visitors bureau?
- Do my students know how to find demographic information online?

Session 1: Thinking About Our Community

What You Need

- ❒ Chalkboard, whiteboard, chart paper, or something else to record ideas on
- ❒ Brainstorming worksheets for students (This can be notepaper or something more colorful—anything for students to jot their ideas down on.)

What to Do

- Guide students in a brainstorming session on features of their community (both positive and negative) and what makes it unique. If applicable, identify well-known landmarks, industries and businesses, and persons. Record students' comments on a chalkboard, dry erase board, or chart paper or ask students to take notes on their brainstorming worksheets.
- Ask students how they could tell others what makes their community special (i.e., through newspapers or posters).
- Explain that they can showcase their work but they must first gather some more information. They can do that using three workstations. Explain the workstations and technology they can use at each station.

Sessions 2, 3, and 4: Exploring Our Community

What You Need

- ❒ Computers with Internet access
- ❒ Digital cameras for station 1 (or use film cameras and have photographs put on CDs or scan them after film is developed)
- ❒ Print resources about community for station 2 (if you decide to provide any); bookmarked Web sites with information about community
- ❒ Electronic spreadsheet or graphing software for station 3; bookmarked Web sites with demographic statistics (like U.S. Census Web site)

Teaching Tip

There are so many fun and exciting ways that students can showcase their community. These include creating a basic report, an electronic presentation, an e-newsletter, a Web site, a travel brochure, an informational brochure for the visitors bureau, and a poster.

Students will have more success with the project if you bring in examples of some of these ideas for them to look at and discuss. This will help them decide what type of final project they want to do and give them something to model as they work on their own activities.

What to Do

Preparation

- Organize stations and materials. Review and print the instructions for each station. Place all instruction guides and worksheets that relate to a station in a colored folder. Use a different color for each station. Provide a brainstorming worksheet for each student to use during the introductory phase of the activity.
- Develop a rotation schedule and project time line for the activity stations.
- Reserve computers for the teams to use when they develop and create their final projects.
- Provide expectations in the form of a chart so students will know what they should include in their final projects.

Suggested Stations (See Handout 3 for station directions)

- **Station 1: Community Walkthrough.** Using a digital camera, students will take photographs of their community. Provide one digital camera for every three students.
- **Station 2: Community Culture and History.** Find print resources and bookmark Internet resources with information about the community's culture and history.
- **Station 3: Community Profile.** Determine the type and source of data you want to use for this station. Students can include data on age, gender, race, income, and other demographic traits. You can find this information locally or from the Internet.

Teaching Tip

The type of work students do at each station will depend on their grade and skill level. If you think it will be helpful, consider a mini-lesson at each station, briefly demonstrating how you use the software and conduct relevant research.

Instruction

- Give a brief overview of each station, reviewing appropriate use of digital cameras and how to use the necessary software.
- Divide students into groups of two or three. The same team of students should remain together for rotations through all stations and when creating the final product.
- Review the schedule, telling students how long they will have to work at each station.
- Begin the first rotation. One group will go to station 1, another to station 2, and another to station 3. If you have more than nine students, plan for additional materials, computers, and digital cameras at each of the three stations.
- Continue through the other stations on consecutive days.
- Assist students. Ask another adult to assist with the digital camera station and other stations.

Sessions 5 and 6: Showcasing Our Community

What You Need

- ❒ Computers with appropriate software for final project (word processing, electronic presentations, Web design, page layout)
- ❒ Information gathered during research (digital images, information for reports)
- ❒ Chalkboard or whiteboard

What to Do

- After students have finished gathering information, discuss what interesting things they found at each station.
- Ask them what station they liked best and why.
- Provide guidelines for planning their final projects. Allow students to offer suggestions for ideas that can be included in the final projects. For example, students might create a newsletter that is at least two pages in length, has at least two photographs, and includes one chart with demographic information.
- Record guidelines on the chalkboard for students to refer to.
- Have students work in teams. If there is not a computer available for each team, they need to first plan their slides/pages on paper before going to the computer to create the final project.
- Ask students to present their final project to other students or adults.

Extend

- Have students talk to local citizen leaders regarding more public ways to share their projects.
- Ask students what other projects that they could do using the same kind of technology (or additional technology) and similar workstations.

Teaching Tip

Rules about field trips in afterschool might present some challenges for station 1, but with some planning and creativity, you can still ensure your students have the opportunity to capture interesting images of their community.

1. Before they begin to take photographs, ask students to consider subjects on the school ground that they can photograph.
2. You might need to arrange for parental permission and a brief excursion to photograph locations in the community.
3. If your students are focusing on individuals in the community, consider inviting these people to visit your classroom to talk to the students and pose for photographs.
4. Ask students to bring in photographs they have of their community and use a scanner to transfer them to digital images.

Handout 2: Brainstorming Worksheet

Use this chart to record features of your community. Describe a feature, its history, its importance, and its contribution to the community.

Architecture Schools, historic buildings, churches, homes, landmarks	
Geography Mountains, deserts, rivers, lakes, prairies, forests	
Business	
Public places Parks, libraries, museums, hospitals, points of interest	
People Historic figures, local celebrities, influential people, family members	
Cultural influences Food, dance, music, traditions, stories	

Handout 3: Station Descriptions and Instructions

Station 1: Community Walkthrough
What Does Our Community Look Like?

Getting Started

At this station, you will take photographs of your community.

What does your community look like? What is physically unique about it? The answers can be seen in many places: in its architecture, landscaping, trees, or people. You can also look at your brainstorming worksheet for ideas. The photos you take can contribute to your presentation.

What You Need

1. Digital cameras
2. Paper and pencil
3. Hardware to save digital images

What to Do

1. Take a walk through the community. Remember to talk to your instructor about where you can go for your community walkthrough and whether any adults will be accompanying you.
2. Take photographs of anything you think is distinctive, attractive, or interesting about the community, or anything that provides clues to its history or culture.
3. Keep a record of what each photograph is of. You may take as many photos as you wish and then choose the best ones for your presentation.
4. Take turns so that each group member has a chance to use the digital camera.
5. Return to your classroom or meeting place at the time indicated by your teacher.

Station 2: Community Culture and History
How Was Our Community Created?

Getting Started

At this station, you will gather information about your community's culture and history.

To get started, think about how your community came to be the way it is today. Who were some of the first people to live here? Where were they from originally? Why did they come here? How have they shaped your community, and what contributions have they made? How do the people who live here make your community special and interesting?

What You Need

1. Local print resources at the learning station
2. Online resources (community Web sites, census information, etc.)
3. Brainstorming chart

What to Do

1. To learn about your community, consider the following questions:
   - When was our community founded?
   - Who were some of the first people who lived here?
   - Where were they from originally?
   - How did they shape our community (think about architecture, food, customs and celebrations, etc.)?
2. Browse through and read the available print and online resources to find the answers to these questions.
3. Take notes on information and ideas that you think you could use as a theme for your presentation and discuss them with your team members. You may want to use the brainstorming chart to organize your ideas.

Station 3: Community Profile
Who Are We?

Getting Started

At this station, you will research the number of people who live in your community and how that number has changed over time.

What You Need

1. Computer with Internet access and Web browser open to www.census.gov (or another Web site or print material with population information)
2. New electronic spreadsheet document on computer screen
3. Notepad and pencil

What to Do

1. Locate population information for your community. You will probably have to focus on the entire city, town, or county, rather than just a particular neighborhood or part of the city.
2. Browse through the information and decide what information about your city your want to focus on. Some possible topics include how the population has grown over the years, the population of different age groups and the median age, or the population of different ethnic groups or races.
3. Enter data into the electronic spreadsheet and generate a graph of the information. Save the spreadsheet for your presentation.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Practice 2

Gathering and Sharing Information

What Is It?

Gathering and Sharing Information helps students learn how to use digital tools to gather, analyze, and share information. The Internet and other digital tools can provide ways for students to collaborate, communicate, and share ideas with others nearby or in distant communities.

What Is the Content Goal?

The goal of *Gathering and Sharing Information* is to help students learn to collect, evaluate, and effectively communicate digital information, while being mindful of safe and responsible Internet conduct.

What Do I Do?

Consult with the day-school teacher to see if he or she has ideas for a collaborative Internet-based activity that could enrich a specific academic content area. For example, corresponding with electronic pen pals (sometimes known as "key pals" or "e-pals") can help improve writing and communication skills. An online collaboration with a science institute that helps students across the United States collect and compare data about wildlife migrations can help with science learning. On a smaller level, students might collect and analyze original data on a problem, question, or concern in their community or school, which can help with learning in multiple content areas.

Work with students to develop ideas for a project that will interest them. Involving the students in this way will increase their sense of ownership and their participation in the activity. Form small teams or groups if you think it is appropriate for the activity and your students' age level. As the project progresses, make any necessary adjustments and look for extension opportunities. When the project is complete, evaluate and plan the next one.

Why Does It Work?

Gathering and Sharing Information works because students help direct their own learning. They observe, record, and analyze data; process reports; and share their findings with others.

Getting Started

Go to the *Gathering and Sharing Information* practice found in the technology section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/technology/pr_gathering_sharing.html) and click on "Resources and References" to find Web sites with projects you can replicate or join.

To watch a video about using technology for gathering and sharing information, visit the Global Schoolhouse Foundation (www.globalschoolnet.org/index.html). Click on the "view videos" link, and then select one of the videos to watch.

Use the before, during, and after writing prompts to write down your ideas on how you might involve your students in script writing and movie making.

BEFORE YOU WATCH THE VIDEO, write down what you already know about students using technology for gathering and sharing information.

DURING THE VIDEO, consider the following:

What role does technology play in the activity? How does it enhance the way students gather and share information?

What academic skills like geography, math, etc., are students reinforcing while they participate in the activity? Be sure to give specific examples.

AFTER YOU WATCH THE VIDEO, write what modifications you might need to make to teach this lesson in your own class.

Remember that assessing student skills, time requirements, and computer resource needs is part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

The Monarch Butterfly Watch

Journey North (www.learner.org/jnorth/) is considered by some to be the premiere citizen science online project (that is, an ongoing scientific project that relies on volunteers, many of whom do not have training in science, to manage research-related tasks such as observation and measurement). The project helps students make their own observations on local butterfly migrations and then fit them into a global context. By collecting, sharing, and analyzing data, students will understand connections between natural and man-made phenomena and make comparisons across populations of other migrating animals. Talk to your students' day-school teachers to see what aspects of Journey North would best address their learning goals. Think about your community and the resources available to enhance such a project, such as local naturalists and city parks.

Grade Level(s):

K–12

Duration:

Seven 45-minute sessions

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with the Internet and e-mail

Student Goals:

- Develop and enhance problem-solving skills
- Participate in a collaborative learning activity and communicate via e-mail with others in different geographic areas
- Use the Internet responsibly for exploration
- Refine data collection and processing skills
- Create electronic journals to assess understanding and to share information with other audiences

Curriculum Connection:

Language arts, science, and math

National Educational Technology Standards Connection:

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

Two or three afterschool students gather around a computer sharing their observations of monarch butterfly migration with other young people across North America. At another computer, a small group researches the butterflies' migration routes and life cycles as well as their host plants and predators. Yet another group e-mails a question to a naturalist who's an expert on butterfly migration. Anticipation of return e-mails and field observations from other students across the nation increases student attendance and generates excitement. Because students are collaborating on real-world questions, their efforts are more meaningful and the students themselves are more enthusiastic.

What You Need

❒ One computer with Internet access for every 2–3 students

❒ Materials suggested by the Journey North Web site for collecting data and documenting activities

❒ Teacher computer with projector to display migration maps (optional)

Getting Ready

- Visit the Journey North Web site (www.learner.org/jnorth/) to learn about current and future projects. Review the "Orientation," "This Season's Projects," and "Teaching Resources" sections. The orientation is especially key to conducting a successful butterfly migration project and provides resources and teaching tips.
- Plan activities and prepare project materials recommended on the Journey North Web site. The Web site has ideas for projects that students can participate in during different seasons. It also offers helpful suggestions and ideas appropriate for different ability levels.
- Reserve technology and obtain other materials that might be needed according to project guidelines.
- Plan how students will be grouped for project activities.
- Make sure you have enough adults or older students to help with this project. Consider asking for parent volunteers to assist with student questions and classroom management.

Session 1: Introduction

What You Need

❒ Teacher computer with projector and Internet access

What to Do

- Begin with a dynamic introduction that solicits students' immediate feedback. Consider using the following questions:
  - Did you know that each fall, millions of Monarch butterflies fly across North America and head south to a remote location in Mexico?
  - Why do you think they migrate to this part of Mexico?
  - Butterflies also return to their original home each spring. Why do they return home each spring?
  - Do you remember seeing these butterflies in your yard during spring or fall?
  - Did you think that they might be just traveling through on their way to or from Mexico?
- Elaborate on the topic of migration as appropriate for the age and grade level of your group. The Journey North Web site offers practical suggestions for this discussion.
- Explain how the activity of tracking the butterflies' migration path will be carried out as a collaborative project with other students across North America.
- Tell students that they can e-mail sightings and other data to the larger community of participants and compare experiences with them during the migration.
- Go to the Journey North Web site and show them migration maps and findings of past projects.

Sessions 2 and 3: Exploring Connections Between Natural and Man-made Phenomena

What You Need

❒ Teacher computer with projector and Internet access

What to Do

- Explore maps, photos, and other resources on the Journey North Web site with the class as a whole using a computer and projector.
- Depending on the age level of your students, include Internet research to learn the following about Monarch butterflies:
  - Length of their migration routes
  - Their life cycles
  - Their host plants and predators
  - Tracking methods as they migrate across the United States to their winter home in Mexico

Sessions 4, 5, and 6: Making Sense of Migration

What You Need

❒ Teacher computer with projector and Internet access

❒ Student materials from Journey North Web site

❒ Student computers with Internet access and word processing software

What to Do

- Ask students to compare Monarch butterflies to other insects and migrating wildlife, as well as to other butterflies.
- Using the Web site's student materials and lesson plans for guidance, have students collect weather data, read postings from other students on the progress of seasonal migrations, and watch for the appearance of Monarch butterflies.
- Read about fields and cities that the butterflies fly over to learn about some environmental conditions that threaten their safety.
- Following the Journey North guidelines and suggestions, have students create electronic journal entries. These will help in assessing student understanding.

Session 7: Student Naturalists

What You Need

❒ Teacher computer with projector and Internet access

❒ Student computers with Internet access and word processing software

What to Do

- Have students create a project portfolio, which is a folder that contains qualitative and quantitative observations, life cycle studies, weather information, maps, research findings, and more. Examples and explanations are on the Journey North Web site.
- At the end of the season, use the portfolios to showcase student work.
- Help students make connections with naturalists, scientists, and others in your community who may be involved with similar work. You may want to invite a migration expert to your classroom. Contact a local college or university for names of possible people. Your chamber of commerce may also be able to help find the right person to talk to your students. Students can also e-mail questions to experts on Pitsco's Ask an Expert Web site. See www.askanexpert.com for more information.

Teaching Tip

Keeping a Record

An electronic journal can be as basic as students recording their thoughts in a word processing document that can be shared through e-mail or hard copy. Depending on students' ages and technology skills, they might also be interested in recording their experiences on blogs. For more information about creating student blogs, see lesson 4, "Getting the Word Out," in the *Living and Working With Technology* practice.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 2

Digital Smiles

This activity teaches students to use a spreadsheet and analyze data in a fun way. They'll love learning to use digital cameras by taking photographs of their classmates' smiles. Data analysis requires higher level thinking and problem solving, both critical skills needed by students in today's world. This activity provides an opportunity to connect to the day-school curriculum in several academic areas, including science, math, and literacy.

Grade Level(s):

4–6

Duration:

Nine 45-minute sessions

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with calculation formulas in spreadsheets, word processing software, and digital cameras

Student Goals:

- Learn the research steps of gathering, analyzing, and presenting data
- Use a ruler to accurately measure length
- Use technology tools to record and analyze data
- Create charts that explain resulting data
- Understand mean, median, and mode (for upper elementary and middle school students)

Curriculum Connection:

Science, math, and language arts

National Educational Technology Standards Connection:

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Imagine This!

"I wonder who has the biggest smile," asks an afterschool instructor. Soon, 15 fifth-grade students are literally grinning from ear to ear, all eager to prove that they have the biggest smiles. Some students show their teeth in wide grins. Others simply show broad smiles and raise their eyebrows in efforts to make their smiles even bigger. "I'm smiling so much my face hurts!" says one girl. After the students have finished their "smile-off," the instructor shows them how to use yarn and rulers to measure the lengths of their smiles. The students record their measurements in an electronic spreadsheet. They analyze the data to determine who has the biggest smile and the group's average smile size. They also document their findings with digital pictures they've taken of each other.

What You Need

- ❒ Rulers showing both customary and metric measurements
- ❒ Yarn and data collection worksheets (see Handout 4)
- ❒ One computer (at least) with electronic spreadsheet software
- ❒ One computer for every two students with word processing software
- ❒ Projector, large screen display, or interactive whiteboard
- ❒ Adult or older student volunteers to help, especially with measurement and data entry
- ❒ Digital camera(s)
- ❒ Video camera to document activity (optional)

Getting Ready

- Assemble materials.
- Practice with digital camera and check batteries.
- Review electronic spreadsheet and word processing software functions (see Teaching Tip at right).
- Rehearse the activity at least once.

Teaching Tip

Word Processing and Spreadsheet Software

Although Microsoft Word and Excel are still the most popular word processing and spreadsheet software applications (respectively), there are many free resources available. The National Center for Education Statistics has a free graphing application online (http://nces.ed.gov/nceskids/createagraph/). Google docs (http://docs.google.com) also has free Web-based word processing, spreadsheet, and presentation applications.

Session 1: Introduction

What You Need

❒ Rulers

❒ Teacher computer with projector

What to Do

- Ask students the following series of questions and discuss their responses: How big is your smile? Who has the biggest smile? How can we measure and then compare the smiles of everyone in the group? How could we describe the length of the smiles (that is, in units of measure—millimeters, centimeters, and inches)?
- Tell the students they are going to become researchers to learn more about children's smiles. Ask them what they think they will discover. For example, do girls or boys have bigger smiles? Do older children have bigger smiles than younger children?
- Explain that to find the answers, they will need to collect and analyze some data.
- Present the steps below, and mention that they are basically the same for all researchers who are interested in finding out about things. Elaborate on the steps as necessary.
  1. Ask a question
  2. Collect data
  3. Analyze data
  4. Interpret results
  5. Present results
  6. Share what is learned and plan next steps
- Write the steps on chart paper or on the board and point out the steps as the activity progresses.
- Explain that students will work in pairs to measure their smiles and then use computer technology to compare collected data. Introduce metric measurements, including centimeters and millimeters, as well as the measuring tool they will use. If they will not be using metric measurements, explain that they will be using the customary measurement of inches.

Teaching Tip

Teaching Students About Data

Although students might have experience with data collection, they might not know what the word *data* means. The word *data* is the plural form of the word *datum*, and it means individual facts, numbers, or other items of information.

To help students understand data collection and analysis, give them some real-world examples. These might include daily attendance at school or at an afterschool program. You can also give examples of sports statistics or a poll taken by an ice cream maker to determine what types of ice cream to offer.

Sessions 2 and 3: Collecting Data

What You Need

- ❒ Worksheets
- ❒ Chart paper to record ideas
- ❒ Yarn
- ❒ Rulers
- ❒ Digital cameras
- ❒ Video camera (optional)
- ❒ Volunteers to help with measurement and photography

What to Do

- Using a piece of yarn, have each student measure his or her partner's smile straight across from corner to corner.
- Transfer the yarn to a ruler and record measurements onto a worksheet or directly into the computer in either customary or metric measurements.
- Have each student take a photograph of his or her partner's smile.
- If you wish to document the activity to share with other instructors or parents, ask one or two students to operate the video camera (optional).

Vocabulary

Mean: The average of a set of numbers

Median: The middle number in a series

Mode: The number in a list of numbers that occurs the most frequently

Sessions 4 and 5: Record and Analyze Data

What You Need

- ❒ Instructor computer with spreadsheet software and projector
- ❒ Adult or older student volunteers to help with data entry

What to Do

- Before class, plan the organization of the spreadsheet. Decide on labels, columns, and rows. Will you make calculations or use any formulas?
- Have your spreadsheet set up to answer the questions used in the original discussion (e.g., Do girls have bigger smiles than boys? Does age affect the size of a smile?).
- Allow teams to enter individual data into a single table in an electronic spreadsheet on the computer reserved for data analysis. In addition to the size of their smiles, the students also need to enter their ages and genders in order to answer the questions posed in the original discussion.
- Once students have entered their data, show them the data table of all students' smiles so they can see the numbers all together.

Teaching Tip

Education World offers many excellent technology tutorials for teachers, including one titled "Teaching Excel" and others on how to perform specific tasks within Excel such as creating charts and graphs. Working through these techtorials will give you confidence in your spreadsheet skills as well as more ideas for teaching with this technology tool.

www.educationworld.com/a_tech/techtorial/techtorial024.shtml

- Ask students who has the largest smile, who has the smallest smile, and how many students have the same size smile.
- Ask students to consider if age or gender impacts smile size, according to the data.
- Introduce the term average and how it is computed.
- Show how the electronic spreadsheet application can automatically figure the average. If appropriate, introduce the terms *mean, median,* and *mode.*

Sessions 6 and 7: Interpret Data

What You Need

❒ Instructor computer with spreadsheet application and projector

What to Do

- Discuss findings and make graph, line, and bar charts from the data.
- Decide as a class which charts are the most effective way to illustrate the data.

Session 8: Evaluate the Process

What You Need

❒ Instructor computer with spreadsheet and word processing applications and projector

❒ Computers for students

What to Do

- Ask each student to write an account of the activity using a word processing application and include their digital photos and the measurements of their smiles.
- Show students how to e-mail their written accounts of the activity and photos to you.

Session 9: Present Data

What You Need

❒ Instructor computer with spreadsheet and word processing applications and projector

What to Do

- Share with students the stories, photos, and smile data you've compiled from their e-mails.
- Evaluate the successful completion of each student's work.
- If problems are evident in data collection or analysis, this can be a valuable learning opportunity. Emphasize that this happens in real science experiments, too.
- Finally, invite students' parents to come see the data results. Have each student share something they've learned from the project. Show parents the data and have students do the interpretation.

Teaching Tip

Using Spreadsheet Formulas

Many spreadsheet applications have "average" as one of the choices you can make when making formula selections.

If your students are familiar with the idea of finding the average and are proficient with a spreadsheet application, you might let them try working with the different formulas themselves.

Extend

Surveys

- Have students conduct surveys. Surveys can be quick. Students can learn more about classmates by asking them questions about themselves on such topics as pets, favorite foods, or habits like television watching. Students can learn about living relatives such as: parents, grandparents, siblings, cousins, aunts/uncles, nieces, nephews. Ask the students to analyze the data they gathered using their surveys.

Published Data

Tracking Temperatures/Weather

- Use the data provided in the newspaper that lists the high and low temperatures for a select group of cities. Include precipitation.
- Create a chart that shows the daily high and low temperatures for the selected cities.

Health, Food, and Nutrition

- Analyze nutritional information from cereal labels or other popular foods.
- Count the numbers of colored pieces of candy to see if they correspond to the manufacturer's label.
- Analyze eating habits by keeping track of food that you eat over the course of one week.
- Track your and your students' sleeping habits.
- Track your and your students' exercise habits.

Original Data

- Gather and analyze water samples from local water sources such as rivers, streams, and ponds.

Handout 4: Digital Smiles Data Worksheet

Name	Smile Length

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Scavenger Hunt for Shapes

This lesson provides an excellent opportunity to have afterschool "buddies" (e.g., middle or high school students work with and mentor early elementary school students). Middle or high school students use digital cameras to photograph scenes in their afterschool program. They then share the photos with younger students, who identify basic geometric shapes in the images. If you don't work with both age groups, you might want to partner with another teacher.

This lesson shows how you can integrate technology and math. The original version of this lesson can be found in the mathematics section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/math/pr_math_find.html.

Grade Level(s)

1–2; 6–12

Duration

Three 45-minute sessions

Technology Prerequisites:

Student: None for grades 1 and 2. If some of the older students know how to use a digital camera and load digital photographs into a slide presentation, this activity will go more smoothly.

Teacher: Basic computer skills, including digital photography

Student Goals:

- Understand basic properties (number of sides, corners, square corners) of shapes
- Recognize regularities, similarities, and differences among shapes
- Learn to use the digital camera (older students)

Curriculum Connection:

Math

National Educational Technology Standards Connection:

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

High school and middle school students use digital cameras to take photos in and around the afterschool site to illustrate geometric shapes for the first- and second-grade students. Their digital photos will show the younger students how simple geometric shapes are part of the world we live in. While the older students are taking pictures, the younger students search for geometric shapes hidden in the classroom to ensure they can identify basic geometric properties.

What You Need

- ❒ Digital cameras
- ❒ One computer with presentation software and projector or interactive whiteboard
- ❒ Different colored cut-outs of squares, rectangles, circles, ovals, and triangles
- ❒ Chairs

Getting Ready

- Using different-colored construction paper, cut out squares, rectangles, circles, and ovals. You should make one shape per student. Include sets of three shapes with something in common. For example, you might give a student a set including a square, a trapezoid (a figure with four sides and sides of unequal length), and a diamond, and help students discover that all three shapes have four sides.
- Save one of each shape and color to review with the students and then hide the remaining shapes around the room.
- Collect or purchase digital cameras.
- Arrange for volunteers to help monitor photographers.

Teaching Tip

Unless you have access to several digital cameras, you may want to purchase disposable digital cameras. Be sure to give clear instructions on how to use and care for the cameras. You will want to have adult volunteers accompany these students as they explore the area for geometric shapes to photograph.

Session 1A: Younger Students Find Shapes

This part of the activity is to be completed with the younger students. The older students do not need to be present for this part of the activity, unless you want to invite them to work with the younger students.

What You Need

❒ Colored shapes

What to Do

- Review each shape and color with students. Ask students to describe each shape, its color, and the number of sides and corners, if applicable. Which shapes are similar? Which are different? Why?
- Tell students that there are shapes hidden throughout the room for each student to find. Explain that after they find their shapes, they need to find two other students to sit with (groups of three) whose shapes have something in common with their own.
- Give students time to find the shapes and the two students whose shapes have something in common with their own.
- Give groups time to discuss the properties of their shapes.
- Ask each group to describe where they found their shapes, what shapes they found, and how they are both similar and different.
- Use guiding questions to help students use what they know about the properties of shapes (i.e., straight sides, number of corners) and colors to figure out what makes another shape similar or different. For example, you may want to ask them what makes their shape like another and encourage them to justify their thinking.

Teaching Tip

A variation for very young students would be to review the shapes and colors and then give each student a shape and ask him or her to find a similar shape that you have hidden throughout the room.

Session 1B: Students Take Digital Pictures

This activity includes both younger and older students.

What You Need

❒ Digital cameras

❒ Teacher computer with projector

❒ Sample photos to show shapes (optional)

What to Do

- Partner one older student with one younger student, or have them work in groups of four depending on the number of cameras available.
- Explain to the older students that they will be working with the younger students to help them learn to recognize shapes. Their jobs are to identify shapes in their daily lives and take photos of them.
- Distribute cameras to students and ask them to take photos of the afterschool site. When they take the photos, they should have specific shapes in mind that will appear in the photo. For example, a photo of a brick wall or a door would include a rectangular shape. A photo of students playing basketball would include a circle (the basketball).
- If students will be leaving the meeting room, be sure to set guidelines on appropriate places for them to go to take photos.
- When students have finished taking photos, transfer them to the computer (older students can create presentations in a separate session).
- View the photos once with the older students so that they are ready to help younger students find shapes.

Session 2: Finding Shapes

This activity will involve older and younger students working together.

What You Need

❒ Computer and projector

❒ Digital photos ready for presentation

What to Do

- Have each group show the rest of the students the digital photos they took.
- Encourage the older students to ask the younger students questions about the photos. The questions should ask the younger students what basic geometric shapes they see in the photos and require them to give more than yes/no or one-word answers.
- Have students go to the screen and outline with their fingers or a ruler the shapes they see. If you are displaying the pictures on a whiteboard, ask students to trace the shapes with a dry-erase marker. Encourage students to consider the properties of the shapes and how those properties determine the shapes.
- Ask the younger students to point out shapes they see in the classroom.
- Thank the older students for their help with the activity.

Extend

Fold a sheet of paper in half and ask the younger students to draw a picture using one or more of the basic geometric shapes on the outside and write a thank you note to the older students on the inside. Depending on the age and ability of these students, the content of the note may need to be written on the board for students to copy.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

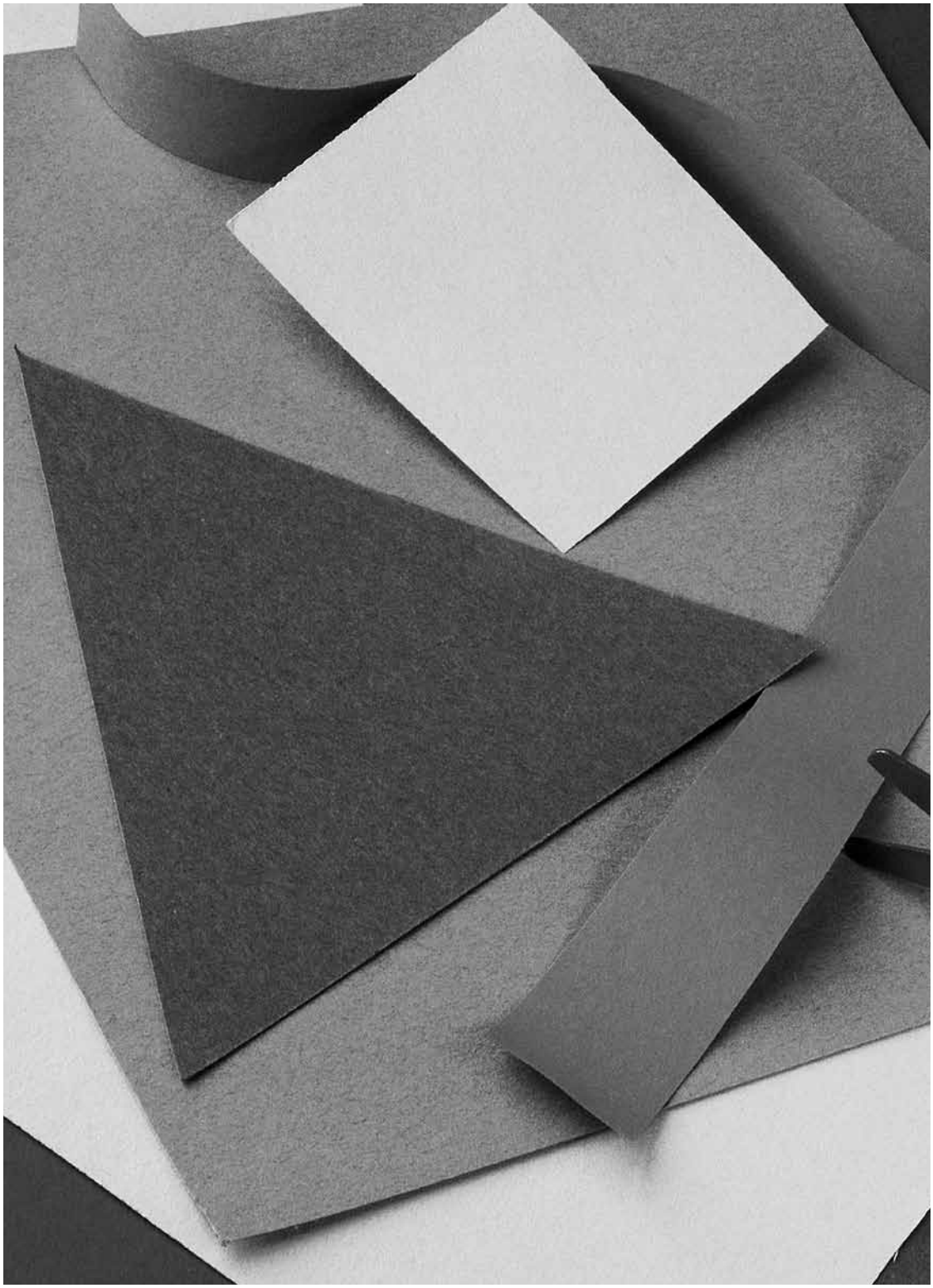
- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?



Lesson 4

Water, Water Everywhere

In this project, students work with community members to understand their local environment. Technology also plays an important role as students use the online community to collaborate with other students and environmental experts to address similar issues on a global scale. This activity is based on an online collaborative project, the Global Water Sampling Project: An Investigation of Water Quality (www.k12science.org/curriculum/waterproj/index.shtml). The project runs twice a year for 2 months, so the following lessons are intended only as overviews.

This lesson shows how you can integrate technology into other content areas. The original version of this lesson can be found in science section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/science/pr_engaging.html.

Grade Level(s):

9–12 (According to the project's Web site, this activity is appropriate for high school students, but instructors have also led the activity with students in grades 5–8 as well.)

Duration:

This project will last at least 2 months. Daily session length will vary according to how you set your time line. Some sessions will last longer than others, and some may be repeated.

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including electronic spreadsheets

Student Goals:

- Understand the local environment and issues that affect it
- Compare local environmental issues to other communities' environmental issues
- Practice scientific inquiry through questioning, hypothesizing, observing and recording data, and analyzing and communicating results
- Use scientific tools to measure
- Keep journals or records of scientific investigations
- Use technology to gather and share information and solve problems

Curriculum Connection:

Science and math

National Educational Technology Standards Connection:

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving, and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

Several teenagers gather on the banks of a creek with their afterschool instructor. Approaching a shallow part of the creek, they dip test tubes into the water to collect samples. They test the water temperature, measure its pH level (acidity), and examine other characteristics of the water. One student takes photos of the team while they perform the tests. Another one records the data in a PDA. After the students have finished collecting samples and testing, they return to the classroom. There, they log on to a Web site for a water sampling project, enter their data, and upload their photos. They also discuss how a nearby construction project might be affecting the water quality. Some believe that the construction is affecting water quality, while others do not. Regardless of their opinions, all of the students are engaged in the project. They record their thoughts in electronic journals and post their opinions on the project's online discussion forum.

What You Need

- ❒ Safety goggles or spectacles
- ❒ Gloves
- ❒ Collection bags
- ❒ Water-testing kits
- ❒ Probes (optional)
- ❒ Digital camera
- ❒ Handheld or laptop computers with spreadsheet software (optional)
- ❒ Computer and projector or interactive whiteboard
- ❒ Adult or older student volunteers to help with technology and field trips

Teaching Tip

Science in Afterschool

Although this lesson involves leading science activities with high school students, you don't have to be a science major (or teacher) to lead it. Planning ahead and being prepared are the best resources. If, after reviewing the Global Water Sampling Project Web site, you want more information, consider enlisting the help of a science teacher from a nearby high school. This person might also be able to speak about water quality issues with your group of students. Another option is to contact a local college to see if some students majoring in biology might be willing to volunteer in your afterschool program for a few weeks, or you might contact your city's water department to see if someone is available to talk to your students.

Getting Ready

- Study thoroughly the collaborative online project, the Global Water Sampling Project: An Investigation of Water Quality, at www.k12science.org/curriculum/waterproj/index.shtml. This project is the basis for this lesson.
- Arrange for a community member to come talk to students about water quality on the first day of the project. This can be an environmental scientist, chemist, or biologist from the city parks department, a college, a city or state water quality board, or the Environmental Protection Agency.
- Use this lesson plan as well as the online project plan and dates to set up a project time line.
- Spend time researching local environmental issues and identifying some potential locations to collect water samples.
- Communicate with parents regarding project plans, including time line and field trips.
- Collect necessary materials for both the science and the technology portion of the activity. Practice using materials.

Safety Considerations

- Adults must supervise all data collection and cleanup. Choose the area wisely, looking for the safest environment for students.
- Students must wear gloves for cleanup and use goggles when any water-testing chemicals are used.
- Do not collect data when a storm is forecast; observe the sky for rain showers and thunderstorms. Avoid streams in high water.
- Have a first-aid kit for all outings. Also make sure to bring sturdy shoes, proper clothing, and sunscreen.

Teaching Tip

How Much Technology?

This activity is flexible enough to let afterschool instructors decide how much technology to incorporate into the lesson. If your program has the equipment or resources to purchase equipment, students can use water probes to test water and record their results on PDA's or laptops. If this is the first time you are completing this project, you can start with simpler, less-expensive materials. Once you decide whether this project is suitable for your program, you can invest in more expensive materials. See the project's page on equipment for more information to make your decision (www.k12science.org/curriculum/waterproj/equipment.shtml).

Session 1: Engaging Students in Environmental Study

What You Need

❒ Computer with Internet access and projector or interactive whiteboard

❒ Arrangements with community member to speak to afterschool students about the local environment.

What to Do

- Invite a guest speaker to discuss and share photos of local streams and/or ponds showing the environmental conditions of the area and explaining the impact of water quality on a community.
- Show the students the Web site of the Global Water Sampling Project: An Investigation of Water Quality (www.k12science.org/curriculum/waterproj/).
- Discuss with your students the collaborative project and what it entails.

Session 2: Investigate Water Quality Online

What You Need

❒ Instructor computer and projector

❒ Student computers (at least one for every two students)

❒ Adult or older student volunteers

What to Do

- Lead students in conducting Internet research about the site where they will complete the project. If your students will be participating in creek restoration or cleanup as part of the project, encourage them to research that topic as well.
- To create a record of their work, students can keep electronic journals, either with word processing software or blogs.
- Have students look at the online project Web site and plan for your field testing.
- Develop a hypothesis (a proposal that students will try to prove or disprove with the data) on water quality and what students expect to see in the data.

Session(s) 3: Field Testing Water Quality

This session will be repeated several times throughout the course of the project so that students can observe changes in the water quality.

What You Need

❒ Safety goggles or spectacles

❒ Gloves

❒ Collection bags

❒ Water-testing kits

❒ Laptops or PDAs for water testing and data recording (optional)

❒ Probes (optional; see "How Much Technology" teaching tip on page 68)

- ❒ Materials for recording data if you are not using PDAs or laptops
- ❒ Digital camera
- ❒ Arrangements for field trip as required by your program
- ❒ Signed parent permission slips
- ❒ Volunteers to help with management

What to Do

- Have students test water for the pH level (acidity), nitrates, dissolved oxygen, and other physical parameters.
- Follow the online project guide for specifics on sample collection.
- Record data on PDAs or laptop computer.
- Document your field testing by taking photos with a digital camera.

Session(s) 4: Submitting Data to Project Web Site

This session will also be repeated as students continue to collect and test water samples.

What You Need

- ❒ Instructor computer with Internet access
- ❒ Student computers with Internet access
- ❒ Data from water tests
- ❒ Digital photos from water testing

What to Do

- Log on to the Global Water Sampling Project Web site (www.k12science.org/curriculum/waterproj/) and submit the data you collected.
- Upload photos to the Web site.
- As a class, analyze the data you collected and decide whether it proves or disproves your hypothesis.
- Have students use technology to share their findings by posting comments in the project discussion area, contacting an expert in the resources listed on the project Web site, or writing in their electronic journals.

Extend

- Investigate opportunities for students to participate in creek restoration projects and measure the impact of their work.
- Invite representatives from local or state environmental agencies to talk to students about careers in environmental sciences.
- Have students create final reports and displays, and invite families and community members to see their work.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

Dance Across the World Wiki

In this activity, students work in small groups to do Internet research and present their findings on folk dances from different cultures and time periods. They will learn about wikis (Web pages on specific topics that users can edit), including how to create and edit wiki entries. Students will also learn about assessing the accuracy of Internet sources.

This lesson shows how you can integrate technology into other content areas. The original version of this lesson can be found in the arts section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/arts/pr_making_connections.html. In the original lesson, students prepare presentations of the folk dances they have researched. In this technology activity, students share their research in wikis.

Grade Level(s):

6–8

Duration:

Four 45-minute sessions

Technology Prerequisites:

Student: Basic computer skills, including word processing and presentation software

Teacher: Basic computer skills, including word processing and presentation software

Student Goals:

- Understand how dance is used to express culture and history and to communicate stories, moods, and feelings
- Work together to research the anthropology of a particular folk dance
- Learn to how to create and contribute to a wiki
- Learn about assessing validity of Internet sources

Curriculum Connection:

Language arts and history

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

A sixth-grade girl reaches into a jar, pulls out a piece of paper, and unfolds it. "I got 'polka.'" she announces. She passes the jar, and the boy next to hear repeats the process, sharing, "I got 'ribbon dance.' I've never even heard of that." Soon all of the students have chosen a dance, and they begin researching the dances on the Internet. After they have learned about the culture and history of the dances and how the dances are performed, they decide to share their information with the online community. The students explore wikis to see what information is already available about the dances they have selected. One boy adds what he has learned about the cotton-eyed Joe to an existing entry on wikipedia.org. A girl creates an entry on how to dance the bhangra on www.wikihow.com. Another girl notices that the wiki she has found on contra dancing contains an error and, after double-checking her own sources, corrects it. The students continue to watch the entries to see how other wiki users edit and update them.

What You Need

- ❒ Computer projector and Internet access
- ❒ Folk Dance Research Guide (Handout 5)
- ❒ Student computers, at least one for each group, with Internet access and presentation software
- ❒ Student accounts for wikis
- ❒ Materials for note-taking (word processing software or pens and paper)
- ❒ CD/tape player and audio-visual equipment

Getting Ready

- Familiarize yourself with wiki technology by taking the wiki "tecktorial" on the Education World Web site (www.educationworld.com/a_tech/techtorial/techtorial098.pdf).
- Identify some potential wikis students can contribute to (e.g., www.wikipedia.org, www.wikihow.com, or www.thestudentwiki.org, which was created for students).
- Make a list of various folk dances from different cultures and time periods (e.g., bhangra, polka, *el jarabe tapatio,* contra dance, cotton-eyed Joe, salp'uri, ribbon dance, adzohu, Irish jig, troika). Write the name of each dance on a small slip of paper. Fold the papers and place them in a bowl for students to draw from.
- Select a folk dance students will not be researching. Be prepared to tell students a few basic interesting facts about the dance and the people who perform it to illustrate what they will be doing in their small groups.
- Print copies of the Folk Dance Research Guide (Handout 5).

Sessions 1 and 2: Researching Dances

What You Need

- ❒ Computer and projector or interactive whiteboard
- ❒ Student computers with Internet access
- ❒ Copies of the Folk Dance Research Guide for each student
- ❒ Bowl or container holding pieces of paper with names of folk dances

What to Do

- Provide a brief introduction to folk dances and explain how they connect to different cultures and time periods.
- Using a dance that students will not be researching, demonstrate what you want them to do in their groups. Show them video that demonstrates the dance, or play the music that accompanies the dance. Include details from the Folk Dance Research Guide to model the kind of information that students will present.
- Divide students into small groups.
- Ask a representative from each group to come forward and choose a dance (written on folded paper and put in a bowl).
- Explain that each group will research one dance, using the Internet to find information and answer the questions in the Folk Dance Research Guide.
- Provide students with the Folk Dance Research Guide and answer any questions they may have about researching their dance.
- Give students time to research the dance they have selected (this process may take more than two sessions).

Teaching Tip

About Wikis

The word *wiki* comes from the Hawaiian word *wiki wiki,* meaning "quick." A wiki is a medium that can be edited by anyone who has access to it. Wikis are typically a collaborative Web site that more than one user can add to and edit, showing how technology can support cooperative learning. Wikis are popular because they often reflect the input of several people and therefore, some argue, offer a more balanced view than the research of one or two experts. One of the disadvantages of wikis is the potential for bias, inaccuracies, or vandalism because anyone can edit them. Be sure to point out some of these advantages and disadvantages to your students and ask how this might influence their work.

Session 3: Introducing Wikis

What You Need

- ❒ Computer with Internet access and projector or interactive whiteboard
- ❒ Wiki pages bookmarked in Internet browser
- ❒ Accounts with selected wikis
- ❒ Student computers with Internet access
- ❒ Copies of the Folk Dance Research Guide for each student

What to Do

- Introduce the idea of wikis and determine how many students are familiar with them.
- Show students some examples of wikis, such as those listed above, explaining that anyone who follows the site's editing policies can create or contribute to a wiki.
- Spend some time discussing wikis as a class and give students time to explore some of the wiki sites. As students become familiar with wikis, tell them that they will use their research on folk dances to either create a new wiki entry or edit an existing one.

Session 4: Working on Wikis

What You Need

❒ Computer with Internet access and projector or interactive whiteboard

❒ Student computers with Internet access and word processing software

❒ Student notes from research on folk dances

What to Do

- Ask each group to decide what sort of wiki contribution they want to make by selecting a wiki site and deciding whether they want to create a new entry or add to an existing one.
- Students can draft their wikis in word processing software and then submit them for instructor approval.
- Once the submissions have been reviewed for appropriate content, grammar, and punctuation, post the wikis on the sites.

Extend

- Share wikis with other afterschool students or family members.
- Facilitate an in-depth project on the strengths and weaknesses of wikis as research sources. Have students compare encyclopedia and wikipedia entries on the same subject. Consider including newspaper articles on wikipedia entries, errors, and frauds. See, for example, "Snared in the Web of a Wikipedia Liar" by Katherine Q. Seelye (www.nytimes.com/2005/12/04/weekinreview/04seelye.html) or "Seeing Corporate Fingerprints in Wikipedia Edits" by Katie Hafner (www.nytimes.com/2007/08/19/technology/19wikipedia.html). Both articles are available free online with registration.

Teaching Tip

What to Wiki

Like so many technology activities, wikis are a way to engage students who struggle with reading and writing. If you don't want to have your students create wikis about folk dances, consider other topics that might interest them: sports figures, music, cities or countries of interest, etc. The site www.wikihow.com, which allows users to create how-to instructions on an array of activities, can be especially appealing to struggling students. They can become experts, giving how-to advice to others, while the instructor, or a friend, can help them write and revise the wiki.

Handout 5: Folk Dance Research Guide

Name of dance _____

What does this dance look like (include movements and costumes)?

What music traditionally accompanies this dance?

What culture and people traditionally perform this dance? Why?

When was this dance developed?

What was occurring in this place and culture during that time period?

Does this dance tell a story? If so, what?

What else about history and/or culture does this dance express?

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Practice 3

Finding and Solving Problems

What Is It?

Finding and Solving Problems is an inquiry approach to learning that starts with posing a question or problem. The instructor uses questions to get students to identify a real-world problem or issue that concerns them (for example, ways to improve recycling or water conservation in their school or community). Students are asked to develop strategies that use technology tools to help solve the problem. This practice promotes critical thinking and supports math and science content and skills development.

What Is the Content Goal?

The goal of *Finding and Solving Problems* is to get students to work cooperatively and develop problem-solving strategies that apply knowledge gained in a content area such as math or science.

What Do I Do?

The key to the success of this practice is identifying a manageable and interesting problem to solve. Start small and consider expanding or extending the activity if it proves successful. Working with students to identify a problem that interests them will increase their sense of ownership and willingness to participate. Encourage students to explore examples of projects from the Internet or from their day-school classes. Find out which technology tools are needed to make the activity successful.

Form teams if you think it is appropriate for the activity and your students' age level. As the project progresses, make any necessary adjustments and look for extension opportunities. When the project is complete, evaluate and plan the next one.

Remember that assessing student skills, time requirements, and computer resource needs is part of the planning process. Consult the Pre-Project Planning Inventory on page 205.

Why Does It Work?

Finding and Solving Problems works because students are actively engaged in interdisciplinary, collaborative, open-ended, and challenging problems. Students can build independent thinking skills, gain ownership, and learn from one another. Furthermore, aligning problem-solving activities to the day-school curriculum can enrich many content areas.

Getting Started

video

Go to the *Finding and Solving Problems* practice found in the technology section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/technology/pr_finding_solving.html) and click on the video.

Use the before, during, and after writing prompts to write down your ideas on reading aloud to students.

BEFORE YOU WATCH THE VIDEO, write down what you already know about students using technology for finding and solving problems. What experience(s) have you had with introducing new technology to students?

DURING THE VIDEO, consider the following:

How does the instructor work with the students to lay the groundwork for the activity? How does he set up the student groups and get them started with the activity? What do you notice about the way he introduces the GPS technology to the students?

What academic skills like geography, math, etc., are students reinforcing while they participate in the activity? Be sure to give specific examples.

AFTER YOU WATCH THE VIDEO, write what modifications you might need to make to teach this lesson in your own class.

Remember that assessing student skills, time requirements, and computer resource needs is part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

Hide and Seek With Geocaching

Geocaching is an outdoor treasure-hunting game in which the participants use a GPS receiver or other navigational techniques to hide and find containers (called "geocaches" or "caches") anywhere in the world. A typical cache is a small waterproof container containing a logbook and "treasure," usually toys or trinkets of little value. This geography-based approach to problem-solving, called geocaching, is a fun and engaging way to enhance and evaluate students' understanding of longitude and latitude, global navigation, and the global positioning system. It also tests their ability to manipulate technology. Activities can be adapted for various learning levels and enrich many subject areas, including geography, math, and science.

Grade Level(s):

3–12

Duration:

Three sessions of 45–60 minutes each

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills and knowledge of how to use a handheld global positioning system (GPS) receiver

Student Goals:

- Enhance and extend students' understanding of global geography
- Increase visual acuity
- Develop technology skills using handheld GPS receivers

Curriculum Connection:

Social studies, math, and science

National Educational Technology Standards Connection:

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Imagine This!

On a sunny afternoon, a group of students gathers in the school playground with an afterschool instructor. The instructor divides the class of 15 students into five groups of three and gives each group a handheld global positioning system (GPS) receiver. Each group is given a different set of coordinates to enter into its GPS receiver. After entering the coordinates, the groups follow the arrows and compasses on their GPS receivers in a treasure hunt for things that the instructor has hidden throughout the playground. Within a few minutes students begin shouting, "We found it!" as they discover the plastic containers filled with pennies, jacks and a rubber ball, small trinkets, or other "treasures." The students then go back to the classroom to discuss the activity and visit a Web site devoted to activities like the one they just completed. They discover that they can be part of an international learning adventure: geocaching. After registering their class's cache on www.geocaching.com, the students hide a "travel bug," or a trackable bug, in the cache outside, note the coordinates, and register those coordinates on the geocaching site. Soon, other geocachers find their travel bug and move it to new locations. As their bug travels around the world, the students follow it on the Web.

What You Need

- ❒ Instructor computer with Internet access and projector
- ❒ Student computers with Internet access
- ❒ Handheld GPS receivers, which may be purchased from a local discount or sporting goods store (one GPS for every 2–3 students)
- ❒ Travel bugs (available for purchase at http://shop.groundspeak.com)
- ❒ Paper and pencil for field notes and journal entries
- ❒ Small plastic containers with lids to use for caches
- ❒ Objects to hide in caches (e.g., game pieces, small toys, trinkets)
- ❒ Small notebooks with pencils (for students to sign when they find the caches)
- ❒ Digital camera (optional)

Getting Ready

- Determine the level of your students' understanding of longitude and latitude coordinates.
- Become familiar with your GPS handheld units. Follow the instructions that are included with your units.
- Familiarize yourself with the resources available at the geocaching Web site geocaching.com.
- Create caches and record coordinates.
- Ask adult volunteers or older students to help you with this activity.

Vocabulary

GPS Receiver: An electronic device that can determine your location within 6–20 feet and help you navigate to another location.

Travel Bug: A tag with a unique tracking number. Geocachers include a travel bug in a cache for future geocachers to find. When someone finds a travel bug, he or she can log on to www.geocaching.com and enter the travel bug's tracking number. This allows the person who first placed (and registered) the travel bug to follow its travels from one cache to another as different geocaches find and move it.

Session 1: Introduction

What You Need

❒ Computer with Internet access and projector

What to Do

- Spark student interest with a discussion of buried treasures. Ask students to share stories of hidden treasures, and then ask them how people kept track of where treasures were. Tell students that they are going to participate in a high-tech treasure hunt with GPS receivers.
- Using a computer with Internet access and projector (optional), go to the geocaching Web site (www.geocaching.com) and provide an overview of this worldwide recreational activity.
- Generate and build on student interest by entering your afterschool location to see what caches might be nearby.
- If possible, for an extension to this lesson, arrange to take students to look for one of the caches registered on the geocaching Web site.

Session 2: Geocaching

What You Need

❒ Handheld GPS receivers (one unit for every 2–3 students)

❒ Volunteers to help supervise this activity

❒ Small plastic containers

❒ Trinkets and small items of interest to use as "treasures" or caches

❒ Small notebooks with pencils

What to Do

- Before the session begins, determine how many caches you will need if you are dividing your class into groups of 2–3 students. Hide "treasures" in caches in the schoolyard and record their coordinates from your GPS.
- Divide the class into groups of 2–3 students, each with an adult supervisor if possible. Older students will probably be able to work in small groups without an adult helper. In order to involve each older student, assign roles, such as GPS handler, logbook keeper, and photographer (if you use cameras). Change roles so that everyone has a chance to use the GPS receiver and enter coordinates.
- Once you have shown students how to use the GPS receivers, give each group a GPS receiver and a unique set of coordinates and instruct the groups to find their cache.
- As students are searching for the caches, discuss units of distance (e.g., miles, feet) and define geocaching vocabulary (e.g., cache, satellite, waypoints, coordinates).
- Have students make an entry in the logbook at each cache to reinforce proper geocaching etiquette.

Teaching Tip

Teaching Longitude and Latitude

Lines of longitude run from the North Pole to the South Pole. They measure how far east or west of the prime meridian a location is.

Lines of latitude run parallel to the equator. They measure how far north or south of the equator a location is. Both longitude and latitude are measured in degree (or hours), seconds, and minutes. If you need to review these concepts, you might have students practice with a map or globe. The *Building Skills and Understanding* practice of this instructor's guide also has an activity on longitude and latitude.

Session 3: Registering and Hiding a Class Cache

What You Need

- ❒ Computer with Internet access and projector
- ❒ GPS receivers
- ❒ Volunteers to help with supervision
- ❒ Cache with travel bug, notebook, and pencil

What to Do

- Discuss the geocaching activity.
- Using a computer with Internet access and projector, go to the geocaching Web site (www.geocaching.com).
- Show students the travel bug and register your cache on the Web site (specific guidelines and tips for setting up your first cache are on the site). Review these with your students.
- Put the travel bug in a plastic container and take your students outside to hide the cache. Keep in mind the tips for hiding the cache that are given on the Web site.
- Once the students have found a good place for the cache, have them note the coordinates using their GPS receivers.
- When you return to the classroom, record the coordinates on your cache registration at geocaching.com.

Vocabulary

Coordinates: A set of numbers that shows an exact location. The coordinates for Washington, DC, for example, are latitude 38° 53' N and longitude 77° 02' W.

Waypoint: A set of coordinates that identifies a point in physical space (typically given in longitude and latitude). For example, the coordinates of students' starting places or of the cache they are hunting are both waypoints.

Satellite: An object that revolves around a planet. The global positioning system is actually a series of 24 satellites that orbit the earth. A GPS receiver will locate four or more of these satellites, figure out its distance from each, and use this information to deduce its own location.

Session 4: Looking Back

What You Need

- ❒ Student writing materials and journals

What to Do

- Have students write a journal entry on their geocaching experience. Ask them to write about what they liked about the activity and what they learned.
- Discuss their journal entries together and include in the discussion vocabulary that might have been new to some, such as longitude, latitude, and coordinates.

Extend

Take geocaching beyond treasure hunting and make it a nature study, creative writing opportunity, or other activity. For some ideas, see the following resources:

GPS in Education - http://rockyweb.cr.usgs.gov/outreach

Geocaching for Kids - www.eduscapes.com/geocaching

Introduction to GPS and Geocaching - http://gpshome.ssc.nasa.gov/content.aspx?s=gps

GPS and Geocaching Web Resource List - www.sabine.k12.la.us/vrschool/science.htm#GPS

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 2

Friendship Bracelets

In this lesson, individuals in an odd-numbered group of students are asked to pair up and create friendship bracelets for each other. Because one student is left without a partner, a solution to this dilemma must be found so that everyone can participate. Using visual learning software programs, such as Inspiration or Kidspiration, students determine that a circular pattern provides a solution to the problem. In addition to problem-solving, this activity offers an opportunity for students to learn more about one another.

Grade Level(s):

2–5

Duration:

Five or six sessions of 45–60 minutes each

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with digital cameras and visual learning software, such as Inspiration or Kidspiration

Student Goals:

- Work together to solve a simple problem using everyday math and logic skills and a visual learning application
- Learn more about each other by creating friendship bracelets
- Learn about the purpose and design of friendship bracelets

Curriculum Connection:

Social studies and language arts

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Imagine This!

Students in an afterschool class are excited at the prospect of making friendship bracelets for a friend. As the students pair off, one student is left without a partner. In order to figure out how no one will be left without a bracelet, the instructor introduces the students to a new way to solve a problem using visual learning software. Together they make an electronic chart showing each student in the class. Experimenting with different combinations of who will give a bracelet to whom, the students realize that pairing off will not work. Instead, they use the software to arrange the class in a circle, with each student creating a bracelet for the student to his or her left until the circle is complete. After seeing how to include everyone, the students get to know the person for whom they'll be making a bracelet so that it will be a reflection of him or her.

What You Need

- ❒ Instructor computer and projector (optional)
- ❒ Student computers (one for every two students)
- ❒ Word-processing software and visual learning software (such as Inspiration or Kidspiration) installed on each computer
- ❒ Digital camera
- ❒ Selection of beads and cords for the bracelets (materials will depend on students' ages)
- ❒ Paper, crayons, and tape measures or rulers

Getting Ready

- Depending on the ages and skills of the students, decide what type of bracelet they should create. Will this be a simple bracelet with colored beads or a woven bracelet with a pattern? Do you want to include a brief introduction to designs and crafts of other cultures? For example, you could explain that the knot craft and handweaving used to create traditional patterns stems from American Indian handcrafts.
- Practice with the visual learning software. You can download a free 30-day trial of Kidspiration at www.inspiration.com/productinfo/kidspiration/index.cfm. A free online graphic organizer is also available on ReadWriteThink at www.readwritethink.org/student_mat/student_material.asp?id=38.
- Gather the beads, cords, and supplies needed for creating the bracelets.
- Practice by making several sample bracelets. The design and complexity will depend on the age and skill level of students.

Session 1: Introduce Topic and Engage Students

What You Need

- ❒ Instructor computer with visual learning software, such as Kidspiration, and projector
- ❒ Student computers with visual learning software
- ❒ Sample friendship bracelet to show students

What to Do

- Ask the students if they either have a friendship bracelet or have ever made one.
- Explain that friendship bracelets are
  - special and usually handmade;
  - given from one person to another as a symbol of friendship;
  - typically made from embroidery thread, wool, beads, and other materials (although styles will vary); and
  - not meant to be removed from the wearer's wrist until they fall off naturally. By tradition, if a recipient wears a bracelet until it falls off naturally, he or she is entitled to a wish for having honored the hard work and love that went into the bracelet. If a bracelet is intentionally removed, however, the friendship is said to be over.
- Introduce the materials students will use for their bracelets and show the samples you made. You may distribute handouts that demonstrate how to make certain patterns and knots.
- Tell students that they are going to make friendship bracelets for each other and that each student can give and receive only one bracelet each.
- Have them choose partners to discuss design ideas. In the pairing process, students will discover that there are an odd number of students and one student is left without a partner. If you want to avoid the awkwardness of having one student left without a partner and feeling excluded, you might want to pair the students off yourself.

  Important: This activity works only with an odd number of students. If you have an even number of students before you start the activity, invite another student to participate, or participate yourself.
- Stop the activity and point out the dilemma. Ask students how they can solve this problem. Tell them that they cannot work in a group of three, have one person make an extra bracelet, or have you be a partner (unless you are participating to make it an odd-numbered group).
- Have students discuss this among themselves, and ask them to share with the group any solutions they might propose.

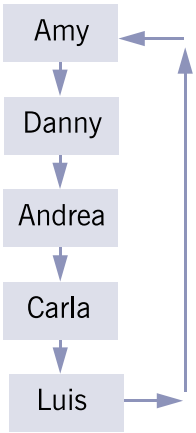
Teaching Tip

Consult with day-school teachers to see how this lesson might enrich their curriculum. Friendship bracelets come from handcrafts of American Indian cultures in the United States, Mexico, and Central America, so an in-depth cultural study might be appropriate. A social studies or language arts teacher might be able to tell you the most appropriate time to complete the activity and direct you toward additional resources.

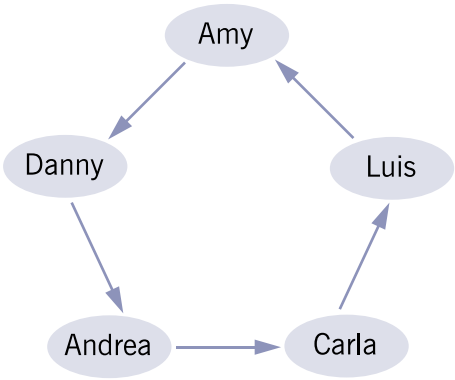
- Introduce the visual learning software and show how it can be used to "map" their solutions. Depending on their age and skill levels, assist students in creating symbols and demonstrate how to move them around the screen.
- Question students and guide them through their problem-solving logic. If appropriate for the group's size or the students' age, use a computer connected to a projector for the demonstration and sharing of ideas and solutions instead of having them use computers themselves.
- The final solution involves a circle pattern with students making a bracelet for the next person in the circle, going around either clockwise or counterclockwise. Using the visual learning software, list students' names in a circular pattern. Draw a line connecting each name to the next, and then connect the last name to the first (e.g., Amy makes a bracelet for Danny, Danny for Andrea, Andrea for Carla, Carla for Luis, and Luis for Amy).
- This solution to the problem may not be what the students want since they may be making a bracelet for someone they don't know; however, one of the goals of this activity is for them to get to know someone new.

Examples

Example 1:
List student names with the mapping software. Then draw a vertical line connecting each name to the next, and then connect the last name to the first.



Example 2:
Arrange students' names in a circular pattern.



Session 2: Making Friendship Bracelets

What You Need

❒ Beads and cords for bracelets

❒ Measuring tape or rulers

❒ Clipboards, clips, or tape to secure string during weaving

❒ Adult or older student volunteers

What to Do

- Arrange the group in a circle. Each student will make a bracelet for the person next to him or her, going around either clockwise or counterclockwise.
- Encourage students to learn more about each other by asking each other about their likes and dislikes.
- Ask each student to take a photo of the student who will receive his or her friendship bracelet using the digital camera and then pass the camera to that student, continuing around the circle until each student's photo has been taken.
- Demonstrate the steps for making bracelets and have each student make a bracelet for his or her designated recipient. If time allows, students may make an additional bracelet for a person of their choice.

Session 3: Friendship Story

What You Need

❒ Computers for every two students with word processing software

❒ Adult or older student volunteers

What to Do

- After students have finished making their bracelets, have them write a short paragraph about the person for whom they made a bracelet.
- If enough computers are available, have students write type up their stories using the word processing software. Ask them to include digital photos of each other and their bracelets.

Session 4: Reflecting on New Friends

What You Need

❒ Instructor computer and projector

❒ Student computers with Internet access

What to Do

- Transfer photos from the digital camera to a designated computer or computers.
- Have students e-mail you their stories and photos.
- Ask students to share their photos and stories using the computer and projector. If a projector is not available, students can print out their photos and pass them around while sharing their stories.

Extend

Explore other types of bracelets and types of materials. For example, ask students to research the Lance Armstrong Foundation's "LiveStrong" wristband (see www.livestrong.org).

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Festival of Bubbles

This lesson combines science with technology. Students blow bubbles using three different bubble solutions and measure the size of the bubbles. The class then records their measurements in an electronic spreadsheet and uses the spreadsheet's math functions to determine which bubble solution creates the biggest bubbles.

The original version of this lesson can be found in the science section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/science/pr_investigating.html.

Grade Level(s):

3–5

Duration:

Three sessions of 45–60 minutes each

Technology Prerequisites:

Student: Basic computer and word processing skills

Teacher: Basic computer skills, including familiarity with electronic spreadsheets and calculation formulas

Student Goals:

- Understand scientific inquiry through questioning, predicting, observing, recording and interpreting data, and communicating results
- Use science and math tools—rulers, tape measures, graduated cylinders—to measure and collect data
- Develop group work skills such as working together and listening to others
- Use technology tools to record and analyze data
- Create bar graph to explain resulting data
- Write and illustrate original poem

Curriculum Connection:

Science, math, and language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

Imagine This!

The classroom is filled with bubbles. One student dips a straw in a tray of bubble solution, takes a deep breath, and slowly blows into the straw to create a large bubble just above the tray. The group giggles as the bubble pops, but another student quickly takes a tape measure to measure the length of the "footprint" the bubble has left in the solution. "Five point seven centimeters," he says. A third student records the measurement in a log book. The group blows two more bubbles with the solution and then moves on to repeat the procedure with two other types of solution, switching roles so that each student gets a turn at blowing bubbles, measuring the length of the footprint, and recording data. The students are trying to determine which soap solution produces the biggest bubbles. Once all of the groups have finished blowing bubbles, the instructor enters everyone's data into an electronic spreadsheet. Using the formula function of the spreadsheet, the instructor helps the class find the average-size bubble blown for each solution. She then highlights the information and converts the data into a bar graph. The students murmur as they point to the bar graph. It is clear which solution produces the biggest bubbles.

Try It in Your Classroom

Students explore soap bubbles, what makes good bubble-blowers, and properties of bubble-making substances. This activity introduces students to electronic spreadsheets and data analysis in a fun way. Data analysis requires higher-level thinking and problem-solving, both critical skills needed by today's students.

What You Need

For the soap solution:

- ❒ 3 gallons of different colored bubble solutions made from different brands of liquid dish soap
- ❒ Glycerin with eye dropper (available at most pharmacies)
- ❒ 3 1-gallon plastic bottles with lids for mixing solution
- ❒ Plastic pint containers with lids (3 per team, 1 for each brand of detergent)

For the activity:

- ❒ Black plastic bags or plastic tablecloths to cover the tables
- ❒ Straws (at least 1 per person)
- ❒ Clear rulers and/or plastic tape measurers (with centimeters)
- ❒ Basket for materials (1 per team)
- ❒ Individual data sheets or learning log handouts
- ❒ Computer and projector or interactive whiteboard
- ❒ Student computers with word processing software
- ❒ Adult or older student volunteers to help, especially with measurement and data entry

For cleanup:

- ❒ Vinegar
- ❒ Sponges (1 per team)
- ❒ Squeegees (1 per team)
- ❒ Bucket with water

Getting Ready

- Prepare soap solutions as follows: fill each 1-gallon bottle with water; remove 1 cup of water from the bottle; add 1 cup of liquid dish soap and 60 drops of glycerin; shake gently. Label the solution. Repeat the process for the other two liquid dish soaps. Note that this recipe makes enough soap solution for weeks of activities; about 1 cup for each group is used in this lesson.
- Review the lesson and print and make copies of the learning log handout (www.sedl.org/afterschool/toolkits/science/pdf/ast_sci_learning_log.pdf) and data sheet (www.sedl.org/afterschool/toolkits/science/pdf/ast_sci_data_sheet_blank.pdf).
- Prepare KWL chart (see "Teaching Tip" on p. 98) using word processing software so that it can be projected from the computer (see example at www.sedl.org/afterschool/toolkits/science/pdf/ast_sci_kwl_chart.pdf).
- Set up the electronic spreadsheet to reflect the Class Data Sheet (Handout 6).

Session 1: Blowing Bubbles and Recording Data

What You Need

- ❒ Soap solutions (see directions under "Getting Ready"). Pour solutions into labeled pint containers.
- ❒ Plastic bags or tablecloths to cover tables
- ❒ Handouts
- ❒ Baskets containing the necessary supplies: 1 cup of solution, straws (1 per person), plastic cover, rulers, tape measure, pencils or pens, learning logs (if used, 1 per person), and sponges. Place the baskets at stations so that there is one solution with corresponding supplies at each station. If you have a large class (and the space), you might want to set up more than one station for each solution so that students are not waiting in line to blow bubbles with a particular solution.
- ❒ Have vinegar, squeegees, and buckets on hand for cleanup (when cleaning up, first squeegee the area to remove as much soap solution as possible, and then sprinkle vinegar over the area and squeegee again or wipe with a sponge).

What to Do

- Engage students by asking where they have seen or blown bubbles and if they have ever used anything unusual to create a bubble.
- Using a computer and projector, record students' answers on the KWL chart.
- Divide students into small groups of four, and hand out learning logs and data sheets to each group.
- Ask one student in each group to gather and return materials, one student to direct the investigation, one student to record the data onto the group's data sheet, and one student to make sure students are wearing goggles and keeping the area clear.
- Have students spread a thin layer of bubble solution about the size of a large pizza over a flat surface. Instruct them to blow a bubble by wetting a straw and gently blowing just above the surface of the wet area. After the bubble pops, ask students to measure the diameter of the bubble "footprint" to the nearest 0.1 cm using a clear ruler or a tape measure and record the data in their learning logs and on the group's data sheet.
- After all students have had an opportunity to blow three bubbles each with one solution, have them clean up their area and rotate to another table with a different solution. They will need about 15 minutes per solution.

Session 2: Analyzing the Data

What You Need

- ❒ Computer and projector or interactive whiteboard
- ❒ Student data sheets from previous session

What to Do

- Before the session begins, familiarize yourself with the electronic spreadsheet software. Practice entering data and creating bar graphs.
- Ask students to complete their data sheets and find their team's average (mean) bubble size for each solution. Each team will report its results. Record each team's results using a spreadsheet on the computer so that students can see each team's data. For an example of a completed class data chart, see the "Actual Data Chart" at www.sedl.org/afterschool/toolkits/science/pdf/ast_sci_data_chart.pdf. Note that the results in this chart will be different from your students' results.
- Have students compare their data, their team's data, and the class data as they complete their learning logs. Discuss the results and have students write a conclusion in their learning logs. Which liquid detergent makes the largest bubble?
- Enter the class data into an electronic spreadsheet. Highlight the data and select the software's graphing option to create a bar graph of the data.
- Ask students how they think an electronic spreadsheet helped them with the activity.

Session 3: Bubble Poetry

What You Need

❒ Student computers with word processing software

❒ Poems about bubbles (optional; you can find these poems by searching for "bubble poems" or "bubble poetry" with Google.com or another Internet search engine)

What to Do

- Read students the poem "Bubbles" by Carl Sandburg.
- Ask students to write their own bubble poems using word processing software. Limit the length of poems to 8–10 lines.
- Have students print out a copy of their poem so they can create an illustration at the bottom of the page.
- Showcase the students' illustrated bubble poetry in your afterschool classroom.

Teaching Tip

KWL Charts

KWL stands for "know," "want to know," and "learned." Students will complete the first two parts of the chart before they begin the activity. In this case, students will be brainstorming what they know about bubbles and what they want to know. Since they will be measuring bubbles from three different solutions, you might steer the discussion towards what produces the biggest bubble. Does it depend on how hard the person blowing the bubble blows, what instrument the person uses to blow, or the bubble solution itself?

Extend

- Research and study how liquid detergent is made.
- Test several more liquid detergents, or vary the amount of glycerin used in one brand of detergent to see if that variable makes a difference in the size of the bubbles.

Handout 6: Class Data Sheet

Team Name	Average Diameter of Bubbles		

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 4

What Happened to Mya?

In this activity, students examine a mysterious case study involving a girl who fainted. By using clues in the case study and additional research, students discover the problem and learn about diabetes, its symptoms, and its treatment. This lesson shows how you can integrate technology into other content areas. The original version of this lesson can be found in the science section of the Afterschool Training Toolkit www.sedl.org/afterschool/toolkits/science/pr_exploring.html.

Grade Level(s):

6–8

Duration:

Several sessions lasting 45–60 minutes each

Technology Prerequisites:

Student: Basic computer skills, including word processing and presentation software

Teacher: Basic computer skills, including word processing and presentation software

Student Goals:

- Work collaboratively to solve a problem
- Use the inquiry process: hypothesizing, questioning, researching, analyzing data, and communicating results
- Understand health issues, specifically diabetes and nutrition
- Use technology tools, especially the Internet, in a responsible and legal manner

Curriculum Connection:

Science

National Educational Technology Standards Connection:

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

Afterschool students work to solve a real-life medical mystery. They use the Internet to research clues provided by a case study of a girl named Mya. As the students discover the cause of the fainting might be related to diabetes, they collaborate with each other to learn about the disease as well as nutrition. Finally, their investigation reveals "what happened to Mya."

What You Need

- ❒ Problem-based learning case study, "What Happened to Mya?" (www.sedl.org/afterschool/toolkits/science/pdf/ast_sci_mya.pdf)
- ❒ Notebooks and pencils
- ❒ Student computers with Internet access and word processing and presentation software
- ❒ Instructor computer and projector

Getting Ready

- Familiarize yourself with the case study and information about diabetes.
- Prepare enough copies of the case study for each student. Make sure you separate the handouts into two stacks, one for day 1 and one for day 2.
- Identify Web sites for students to learn about Mya's symptoms in general and diabetes in particular.
- Because you will be guiding your students' online research from your computer, decide which search engine you will use and practice searching for Mya's medical symptoms as described in the scenario for day 1.

Teaching Tip

Useful Web Sites

American Diabetes Association Youth Zone
www.diabetes.org/youthzone/youth-zone.jsp

National Diabetes Education Program: Resources on Children and Adolescents
www.ndep.nih.gov/diabetes/youth/youth.htm

Diabetes Youth Services
www.dys4kids.org/default.asp

Session 1: Introduction to Mya's Mystery

What You Need

❒ Copy of "What Happened to Mya?" case study

❒ Student copies of "What Happened to Mya?" for day 1 only

❒ Teacher computer with Internet access and projector

What to Do

- Engage students in the story of Mya by reading aloud the scenario for day 1.
- Explore what happened to Mya. Discuss Mya's symptoms and list the data or clues provided in this first scenario.
- Use the questions that follow the first scenario to guide student discussion.
- Note any other student questions that require research to answer.
- Using the search engine you've determined is most appropriate for your students and this problem, show your students how to find answers to their questions using key words and phrases.
- Guide students in taking notes as you discover answers to their questions.
- Have students write the answer to the following question in their notebooks: Why do people faint?
- Explain the importance to your students of accurately citing sources. This lesson provides a great opportunity for you to discuss basic copyright law with your students. See "The Learning Page" on the Library of Congress Web site (http://memory.loc.gov/learn/start/cpyrt/) and TekMom's "How to Cite a Web Resource" (www.tekmom.com/cite/index.html).

Sessions 2 and 3: The Mystery Continues

What You Need

❒ Copy of "What Happened to Mya?" case study

❒ Student copies of "What Happened to Mya?" for day 2

❒ Computers with Internet access (at least one computer for every two students)

❒ Teacher computer with Internet access and projector

What to Do

- Reengage students in Mya's story by reading aloud the scenario for day 2.
- Continue the discussion of what happened to Mya.
- By the second day, students should be able to focus their research on diabetes, its symptoms, and its types. Ask students to answer the following questions, which also appear on the handout, and record their answers in their notebooks:

- What are the symptoms of diabetes?
- What is the difference between type I and type II diabetes? What is the cause of diabetes? What is pre-diabetes?
- What is insulin, and what happens when a person has too much or too little?
- What kinds of exercise and nutrition are helpful in controlling and preventing diabetes?
- What do diabetics do to monitor their glucose levels?
- What complications are associated with diabetes?
- What can you do to prevent diabetes?
- How can you help a person with diabetes?

- Discuss the questions on the handout. Guide student discussion so students use the "clues" given in the scenario to help answer the questions.
- If you have bookmarked any Web sites for students to access, show them the sites and what information they have. Review search strategies and search Web sites you want your students to use in their research.
- Pair students for research, instructing them to take turns at the keyboard.
- Monitor student research closely and ask guiding questions as they work.
- Remind them to carefully cite their sources.

Sessions 4, 5, and 6: What Happened to Mya

What You Need

- ❒ Copy of "What Happened to Mya?" case study
- ❒ Student copies of "What Happened to Mya?" for day 2
- ❒ Computers with Internet access and presentation software (at least one computer for every two students)
- ❒ Teacher computer with Internet access and projector
- ❒ Volunteers to help with technology

Teaching Tip

Presentation Software

Review how you will teach your students to use presentation software. Consider asking adult and older student volunteers to help with this part of the lesson. About.com offers several articles worth your attention, particularly "9 Tips for Student Presentations" (http://presentationsoft.about.com/od/classrooms/tp/student_tips.htm).

What to Do

- Using the their notes, students will summarize their findings using presentation software.
- Review presentation software basics with students.
- Consider changing student pairs for this part of the lesson, perhaps pairing students who have used the software with those less familiar with it. Keep in mind that students pick up technology skills easily and quickly.
- When students have finished their presentations, ask them to submit them to you either by e-mail or by saving them to a CD-ROM or a media storage device.

Session 7: Presenting Mya's Case

What You Need

❒ Copy of "What Happened to Mya?" case study

❒ Student copies of "What Happened to Mya?"

❒ Teacher computer with Internet access and projector

❒ Volunteers to help with technology

❒ Student presentations

What to Do

- Student pairs will share present their findings to the rest of the class using the computer and projector.

Extend

- Invite someone who is diabetic or who works with diabetics to talk to students about nutrition and diabetes.
- Have students plan healthy snacks for the afterschool center based on their new understandings.
- Collaborate with a local hospital or clinic to plan a family health night and include information on diabetes as well as free glucose testing.
- In the math section of the Afterschool Training Toolkit, you'll find a lesson with a nutrition theme, "What is the 'Best' Snack?" Even though it's a data and probability lesson designed for lower elementary school students, it could be adapted for students in higher grades as an appropriate lesson to follow "What Happened to Mya?" (www.sedl.org/afterschool/toolkits/math/pr_math_find.html).

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

Urban Planning

This activity[4] uses simulation software called SimCity or SimTown to create learning opportunities in which students solve simulated real-world problems and witness the effects of their decisions. Software may be purchased, but SimCityClassic can be played online at no cost (http://simcity.ea.com/play/simcity_classic.php). Simulations provide a unique opportunity to use and develop problem-solving skills that are not used in other types of learning activities.

Grade Level(s):

4–12

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with SimCity

Duration:

Six 45–60 minute sessions

Student Goals:

- Increase students' understanding of how people are influenced by, adapt to, and alter their environment
- Work to resolve community challenges
- Learn that different cultures adapt to, modify, and have an impact on their physical environment (e.g., the use of natural resources, recycling, housing, clothing, and physical environmental constraints and hazards)
- Make connections between past and present learning experiences
- Work with an open-ended software application to achieve results or conclusions

Curriculum Connection:

Social studies, math, and language arts

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

[4] This activity was adapted from *Constructivism and Technology in the Classroom.* (Fall 1998). TAP into Learning (volume 1, number 1). SEDL: Austin, Texas.

Imagine This!

"Our town is burning!" A group of 10-year-old boys is panic-stricken as flames begin to engulf the stores and small homes of their street. "Call the fire department!" one cries. "We can't! We don't have a fire department," another answers in exasperation. Helpless, with no fire station or assistance available, the boys can do nothing but watch as their town burns to the ground. Fortunately, this scenario, while realistic, does not actually result in the loss of homes and lives. Rather, it occurred in an afterschool classroom using a popular urban-planning simulation software program.

Teaching Tip

About SimCity

In SimCity, the rules are based on city planning and management, including the following factors: human—residential space and amenities, availability of jobs, and quality of life; economic—land value, industrial and commercial space, unemployment, internal and external markets, electric power, taxation, and funding of city services; survival—strategies for dealing with disasters, crime, and pollution; and political—zoning and keeping residents and businesses satisfied with your city and your performance.

What You Need

- ❒ SimCity or SimTown software or SimCityClassic online
- ❒ Computer and projector or interactive whiteboard
- ❒ Student computers
- ❒ Adult or older student volunteers familiar with the game

Getting Ready

- If you purchase the SimCity software, you will need to download it onto all the computers. However, if you're going to use the free version online, all you need to do is have the Web site (http://simcity.ea.com/play/simcity_classic.php) up on students' computers and ready for registration, through which you will guide the students using your computer and projector.
- Practice with the software and familiarize yourself with the simulation game.
- Locate an aerial map of your community. To do this, go to Google.com, click on the "Maps" link at the top of page, and type in the name of your town. You can select an aerial (satellite) map, a road map, or a combination of both. Practice manipulating the commands on the map.

Session 1: Making Connections

What You Need

❒ Student computers with the appropriate simulation software loaded or with the free online version open to the registration site

❒ Teacher computer with Internet access with a Google map of local area ready to view

What to Do

- Engage students in a group discussion to draw on their knowledge of their homes and community. They will use this community to develop awareness of issues before they began planning their "sim city."
  - Discuss issues, such as traffic and the layout of streets, that the community faces. As students discuss positive and negative features of their city or community, introduce terms like "urban planning" and "town planning."
  - Ask students to think of potential challenges a community might face. These might include traffic, how to manage waste disposal, pollution, and natural disasters. Then ask students how they think community leaders might address some of these problems.
- Use Google Maps to give the students an aerial view of their community.
- Divide students into small groups and ask them to make a physical survey of a major street in their town or the local neighborhood, recording the number of residences and businesses. Tell them to note areas of trash dumping, poor road quality, vegetation, and other potential fire hazards. Google Maps should give students a good enough view for them to make the survey. However, if they still have questions, you will need to determine the best way for them to gather the data (i.e., field trip).

Sessions 2–5: Collecting Data, Finding Problems, Assessing Solutions

What You Need

❒ Student computers with the appropriate simulation software loaded or with the free online version open to the registration site

❒ Google Map(s) of local area ready to view on teacher and student computers

What to Do

- Show students how each team will use SimCity to construct a model of the streets they investigated in their community and then use this model to come up with potential solutions to the various issues the community faces.
- After students have used the program for about three sessions, ask them to meet as a group to discuss their experiences. The discussion should cover challenges, successes, and failures. Ask students what unexpected challenges they faced as they built their communities and how they met those challenges.

Session 6: Applying Community Solutions

What You Need

❒ Flip chart to record ideas

❒ Representative of local government as afterschool guest

What to Do

- Invite the mayor or a city council person to your afterschool program to speak to the class about some of the community challenges students have learned about during the activity.
- Encourage students to prepare a list of questions for the speaker ahead of time.
- Ask students to share questions and proposed solutions with their guest speaker.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Practice 4

Living and Working With Technology

What Is It?

Living and Working With Technology exposes students to the use of technology in the working world and everyday life. This practice can involve many different kinds of activities, including independent or collaborative projects, mentoring, internships, information-gathering, and communication with experts. All of these can be ways of introducing students to career opportunities they might otherwise overlook.

What Is the Content Goal?

The goal of *Living and Working With Technology* is to get students to consider how technology relates to their own lives as well as society at large. This includes helping students develop positive attitudes toward technology; encouraging responsible practice and use of technology, including online safety; and understanding how technology can be a part of lifelong learning. The practice is multidisciplinary, as it focuses on all academic content areas.

What Do I Do?

This practice lends itself to many different kinds of activities, including problem-solving and project work. These suggestions may help you generate ideas:

- Have students make an inventory of technology they see and use in their everyday lives and investigate that technology in greater depth. Have them consider questions about how it works, how it came to be, and how it is changing.
- Have students research professions that might interest them and determine how technology is used in that field. For example, how are technology requirements defined in online job postings for that field? How does technology contribute to the success of pop singers and professional athletes?

- Contact local businesses, nonprofits, arts organizations, research agencies, government agencies, community colleges, and higher education institutions to create projects, mentorships, scholarships, and internships. Determine the best fit among the business, your students (age and grade), and your goals. When the fit is right and students have a good experience, they can be inspired to actively consider a career in this area.

Why Does It Work?

Activities that support *Living and Working With Technology* expose students to authentic uses of technology and make connections to the students' education and future. Students develop positive attitudes toward technology and learn how they can use it in their lives outside of the classroom.

Getting Started

Go to the *Living and Working With Technology* practice in the technology section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/technology/pr_living_working.html) and click on the video.

Use the before, during, and after writing prompts to write down your ideas on how you might involve your students.

BEFORE YOU WATCH THE VIDEO, write down what you already know about music production and composition technology.

DURING THE VIDEO, consider the following:

How does the instructor work with the students to lay the groundwork for the activity and get them started?

What academic skills like reading, math, etc., are students reinforcing while they participate in the activity? What additional academic skills could be enhanced in a music production activity?

AFTER YOU WATCH THE VIDEO, what academic skills like reading, math, etc., are students reinforcing while they participate in the activity? What additional academic skills could be enhanced in a music production activity?

Remember that assessing student skills, time requirements, and computer resource needs is also part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

Exploring Technology in Careers

In this lesson, students consider how technology is used in the workplace. Through a series of group and individual activities, they assess their skills and interests, identify their "perfect" job or career, and research the role technology plays in that job or career. The lesson helps students begin to think about how their education can help them prepare to meet their career goals.

Grade Level(s):

6–12

Duration:

Four sessions of 45–60 minutes each

Technology Prerequisites:

Student: Basic computer skills, including how to conduct Internet searches, find Web addresses (URLs), and navigate links and Web pages on the Internet

Teacher: Computer skills, including how to conduct searches, find Web addresses (URLs), and navigate links and Web pages on the Internet. If an electronic spreadsheet is used, the teacher or a tech helper needs to know how to use this software.

Student Goals:

- Introduce students to career opportunities in technology they otherwise might overlook
- Help students research, compare, and contrast possible career choices and educational requirements
- Encourage students to remain in school and continue their education to help them meet their job or career goals

Curriculum Connection:

Language arts, the arts, social studies, math, and science

National Educational Technology Standards Connection:

1: Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

An afterschool instructor leads a discussion on the students' interests and possible careers. They talk about the importance of technology in the workplace today and technology's place in their future. Students reflect on this discussion in their electronic journals, take online interest and skill assessments, and research careers on the Internet.

What You Need

- ❒ Instructor's computer with Internet access and projector
- ❒ Student computers with Internet access and word processing software
- ❒ Electronic spreadsheet software to list and compare career choice options (optional)
- ❒ Access to e-mail to contact schools and companies regarding careers and educational requirements (optional)

Getting Ready

- Make an informal preliminary assessment of students' needs and interests and what will influence their job interests and opportunities. Students' age, gender, family background, and educational level will be primary influences. You can make this assessment through casual conversations, writing activities, or conversations with the students (while respecting their privacy).
- Prepare a list of questions to use for group discussion and student journals that will encourage students to think about careers.
- Preview the Afterschool Training Toolkit videos listed below to determine which would be appropriate to show to students. Please note that the toolkit is a staff development tool rather than a set of activities for students. However, these two videos are recommended for student viewing because they show students in afterschool programs using technology in ways that help them in their careers.
  - Developing Self-Expression and Creativity (video) www.sedl.org/afterschool/toolkits/technology/pr_developing.html
  - Living and Working With Technology (video) www.sedl.org/afterschool/toolkits/technology/pr_living_working.html
- Review the following Web sites and determine which are best suited for your students. Bookmark sites that may help them in creating student journals.
  - Pathways to Technology (www.pathwaystotechnology.org/)
  - GetTech.org (www.gettech.org/)
  - U.S. Department of Education "Especially for Students" (www.ed.gov/students/)
  - Careerlink (http://careerlink.com)
  - Junior Achievement Student Center "Your Map to Tomorrow" (http://studentcenter.ja.org/)

Sessions 1 and 2: Investigating Student Skills and Interests

What You Need

❒ Instructor computer with Internet access, QuickTime or Windows Media Player, and projector

❒ Student computers with Internet access and word processing software

What to Do

- Engage students in a group discussion on their interests and skills. Guide the discussion to what role technology might play in future jobs and what technology skills individuals in those jobs might need.
- Tell students they are going to develop an electronic journal using the word processing application on their computers. Ask them to focus their journal entries on the following topics:
  - Their strongest abilities
  - Their interests
  - A description of a "perfect" job or career
  - A description of the kind of lifestyle they want
  - The name(s) of someone they know who does what they would like to do
  - Ways to learn more about their "perfect" job
- Allow students to investigate the Web sites you've bookmarked for them before they begin their journals.
- Have students take the skills assessment on Careerlink.com (click on "For Students" and then "Learn About Yourself").
- After students have completed the skills assessment on Careerlink.com, they can see a list of careers or fields that might interest them. Have students select one or two careers and review them more thoroughly while on the Web site. Ask them to determine what technology skills these fields require.
- Ask students to make their initial journal entries reflect what they've discovered regarding their skills, interests, and possible career choices.

Teaching Tip

Working With Schools

It is possible that some of the students in your afterschool program have begun career research in their day schools. To save work and avoid overlap, it might be helpful to contact a school counselor or a teacher who offers career preparation classes to see what students have been doing during regular school hours. You can build on this work and maintain students' interest by avoiding duplicate activities.

Session 3: Using Technology in the Workplace

What You Need

❒ Student computers with Internet access and word processing software

What to Do

- Have students discuss as a group what they have written in their journals. Ask each student to speak. Find out if there are several students with the same interest. Discuss the pros and cons of the various choices.

- Move the discussion along and ask students to consider the role that technology plays in their job or career choices. Even professionals who don't work in technical fields wind up using technology in their jobs. Ask students to think how some of the following professionals might use technology in their jobs: musicians, nurses, teachers, mechanics, sales clerks, and administrative assistants. Then ask students to think of how they see technology used in their daily lives.
- Ask students what types of technology skills they have now. What technology do they like best and why? What technology do they like least and why? How could technology help them achieve their goals?
- Ask students to return to their journals and make an additional entry reflecting technology in the workplace, especially how it might impact their career choices.

Session 4: Using Technology to Explore Jobs and Careers

What You Need

❒ Student computers with Internet access and word processing software

What to Do

- Have students go online to find out more about their career interests and the educational and skill requirements of these careers.
- Ask students to determine technology skills required, potential earnings, colleges or universities with appropriate programs, scholarship opportunities, and financial aid information.The Web sites you bookmarked for lessons 3 and 4 will provide a good starting point for student research.
- Have students make entries into their journals, including Web site addresses they would like to review again for additional information about a career, job, or school.

Teaching Tip

Search Engines

If your students need help finding appropriate Web sites, take time to give the class a lesson on Internet searches. The article on search engines for kids at http://searchenginewatch.com/showPage.html?page=2156191 and information on searching the Internet at www.internet4classrooms.com/search.htm will give you excellent ideas and advice for helping students find appropriate Internet resources.

Extend

- Plan an activity in which students interact with a professional in a specific field of interest or a project through which students can link up with an organization or company in your community.
- Have students write their resumes or rehearse an interview. Engage students in a discussion to determine their interests. Remember to keep the focus on the way technology is used.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 2

Computer Repair and Recycle

In this project, students learn how computers are put together and operate by repairing and refurbishing computers donated by the community. They learn the basics of computer assembly, how to diagnose and solve hardware problems, and how to install software. They can then give their "recycled" computers to a community group or individuals in need or keep them for themselves.

Grade Level(s):

6–12

Duration:

6–8 sessions (maybe longer, depending on students' abilities and interest)

Technology Prerequisites:

Student: Basic computer skills

Teacher: Medium computer skills and some experience assembling and disassembling computers. If you do not have these skills, ask a staff member or volunteer who is able to assist with this lesson.

Student Goals:

- Learn basic computer hardware and software components
- Learn about the operation of computer technology systems
- Learn to disassemble and rebuild computers, setup and run a printer, upgrade hardware, identify and correct basic hardware problems, and load and run software programs

Curriculum Connection:

Language arts, math, and science

National Educational Technology Standards Connection:

1: Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

4: Critical Thinking, Problem-Solving, and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

Anyone who walks into the room would undoubtedly do a double take and wonder what happened. There appear to be computer parts everywhere. A second glance provides more information: the computer parts are sorted and set aside until they are needed as students crowd around a microprocessor and motherboard. With the help of a community volunteer, the students are refurbishing an old computer. After meeting a few more times, they turn the computer on to see if it works. It does! The students decide to make the computer available for use in their afterschool program so that their friends and classmates can learn about technology, too.

What You Need

- ❒ Used computer hardware components and peripherals that need to be refurbished (these can be donated by the community)
- ❒ Software
- ❒ Curriculum that takes students through all disassembly and reassembly steps and learning of software applications. See Dell TechKnow (www.dell.com/k12/techknow).
- ❒ Storage facility and work center or dedicated classroom

Getting Ready

- Become familiar with the Dell TechKnow curriculum (www.dell.com/k12/techknow) or whatever curriculum you select. This will help you with your daily planning and schedule.
- Read about other successful computer refurbishing programs. See, for example, Computers4Kids (www.computers4kidsinc.org) or read "Kids Build Computers and a Future" (www.education-world.com/a_tech/tech012.shtml).
- Set realistic goals for your project.
- Find a source of donated computers either in the community or from the local school district. Local thrift stores might also have old, inexpensive computers.
- Find a storage facility as well as a work center.
- Design your program. Start small!
- Recruit volunteer helpers and other interested parties.
- Gain financial and administrative commitment for the design and structure of the program.

Teaching Tip

Community Connections

Like many technology activities, if you feel that you do not have the skills or experience to lead this project, see it as an opportunity instead of an obstacle. If you do not feel comfortable showing students how to refurbish computers, there is most likely a community member who does and would enjoy volunteering a few hours a week if you were willing to help facilitate the project. Consider approaching a local computer repair shop, technology business, or community college for help.

What to Do

❒ Recruit students.

❒ Carry out the program.

❒ Reflect and assess outcomes.

Note: The curriculum you select will guide your daily planning.

Extend

- Have students keep electronic journals or blogs about their experience refurbishing computers.
- Ask students to research careers in computer repair and refurbishment. What additional skills would they need for a job in this field?

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Building Robotic Machines

With LEGO activities students learn how "robots" are different from "robotics" and how real robotic inventions are used for purposeful jobs like welding joints during car assembly, retrieving treasures from ocean depths, or harvesting crops. This lesson provides experience-based ideas for setting up a LEGO lab classroom, introducing students to robotics and leading students in their first construction.

Grade Level(s):

4–12

Duration:

Multiple 60-minute sessions, twice a week (projects could require several weeks to complete)

Prerequisites:

Student:

- Experienced instructors of LEGO Robotic activities find that students who are most successful in these activities must have at least fourth-grade reading skills, which are required for following and understanding assembly instructions.
- Students need to have some visualization skills in order to assemble LEGO pieces into three-dimensional structures.
- Some instructors recommend that students first successfully understand machines and concepts of motorization.

Teacher:

- Instructors of robotics activities should have good problem-solving skills and develop an overall understanding of hardware and software in LEGO sets.
- Instructors can be drawn from high school or middle school science or technology programs; physics, engineering, or technology programs at a local university; or a local technology company.
- A basic understanding of programming, especially LOGO, can be helpful for the more advanced projects that use the RCX, a programmable LEGO brick that is the key to turning models into robots (see www.lego.com/eng/education/mindstorms/home.asp?pagename=rcx for more information).

Student Goals:

- Apply practical math and scientific concepts while learning design, mechanical construction, and computer programming
- Learn to read and follow directions carefully
- Visualize, think, and problem-solve in a three-dimensional perspective
- Discover properties and use of basic electronic light, rotation, touch, and temperature sensors

Curriculum Connection:

Math, science, and language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

4: Critical Thinking, Problem-Solving, and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

Afterschool students are excited to come to class because they are building robotic arms. Working in pairs, they learn that robotics go beyond scary cinema creatures to carefully engineered constructions that make positive contributions to society. After they learn basic construction techniques, they create their own robotic inventions with practical functions of interest to them.

What You Need

- ❒ LEGO system, including an RCX (To help make this investment choice, see "Choosing the Right LEGO System" on page 206.)
- ❒ Teacher-created parts inventory, a list of LEGO parts to help students keep track of the different LEGO robotic parts
- ❒ Storage space
- ❒ Computers
- ❒ Work space
- ❒ Assistants or volunteers

Getting Ready

- Spend some time familiarizing yourself with robotics. Helpful Web sites include
  - The LEGO Mindstorm Web page (www.lego.com/eng/education/mindstorms/default.asp)
  - "Building a Better Robot: A Robotics Competition Introduces Students to Engineering" on the Edutopia Web site (www.edutopia.org/robotics-competition-engineering)

Sessions 1 and 2: What Is a Robot?

What You Need

- ❒ Large table in center of room with several boxes and trays holding a variety of LEGO blocks, wheels, rods, and gadgets
- ❒ Sheets of white paper and colored pencils for drawing
- ❒ One computer with Internet access and projector or interactive whiteboard
- ❒ Select some articles and examples of robotics from the Web sites listed in the "Getting Ready" section of this lesson.

What to Do

- Engage students by asking them what they think a robot is. Discuss what students know and believe about robots.
- Distribute paper and colored pencils.
- Ask students to draw a picture of a robot or robots.
- After students have completed their drawings, ask them to look at the robots they have drawn and consider the following questions:
  - How does your robot move?
  - Does it have arms? If so, does it have joints? Where?
  - Does it have any other moving pieces? If so, how and where do they move?
  - Does your robot have a purpose?
- As students start to think differently about their drawings, walk around the room and talk to each student individually, asking more questions about their drawings.
- Ask students to think like an engineer or a scientist would think—more analytical and in more detail than they might normally think.
- Using the LEGO mindstorm and Edutopia article on robotics, show students some examples of robotics. Ask students how they think these robots move and are powered. Ask students to visualize how their own arms, hands, legs, and feet move.
- Ask students to look at their robot drawings again and think more about their designs.
- Have students share what they might do differently now that they have seen pictures of other robots.

Session 3: Building With LEGO

What You Need

- ❒ Trays with LEGO pieces
- ❒ Large table in center of room
- ❒ Parts inventory of LEGO pieces
- ❒ One computer and projector

What to Do

- With your LEGO parts inventory projected for all students to see, explain that as a scientist or engineer, it is important to have tools and parts in the laboratory well organized and neat. Even though this class might not have a cabinet with drawers for each kind of piece, which would be ideal, there are bins for the different sizes and types of blocks, beams, plates, wheels, connector plugs, gears, axles, sensors, and lamps.
- Show students all the different parts as you talk and explain the organization of your classroom laboratory.
- Explain they will work in pairs and will share responsibility for gathering necessary parts, keeping track of those parts, and returning them to their project bin with project instructions.
- Show students the RCX, which they will learn to program later for the remote-controlled piece of their project.
- Explain to students that for the first project everyone will be constructing a robotic arm. This project will teach them basic instruction and assembly of the LEGO pieces. It will also show them the importance of following instructions and visualizing their construction from the illustration on the instruction sheet.

Sessions 4 and 5: Constructing a Robotic Arm

What You Need

❒ Work space

❒ Project bins for each team

❒ Robotic arm instructions for each team

❒ Adult or older student aide

What to Do

- Put students in teams of two.
- Have students collect their materials from the parts trays.
- Ask students to read the instructions and begin to build the robotic arms.
- As you plan for this project, keep in mind that it will be challenging for some and quite easy for others. Be sure to consult the LEGO Teacher Guide for ideas of individual project extensions.
- As students complete the project, look at what they've made together as a class. Discuss what practical functions a robotic arm might have in society. Ask students what they learned as a result of this effort and what they would do differently. Continue to emphasize the importance of reading carefully and thoughtful visualization.

Extend

- The teacher guides, lesson plans, curricula, worksheets, and video examples in various LEGO sets, from commercial publishers, and from the Internet provide hours, if not years, of extensions for students and teachers interested in technology and engineering.
- More advanced projects utilize motorized levers, gears, and pulleys as well as multiple types of sensors.
- Local and national robotic competitions will challenge students' problem-solving, practical math, scientific, mechanical construction, and computer programming skills.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 4

Getting the Word Out

This activity shows how you can use blogs for a variety of writing activities. The fun of using computers makes blogging appealing to all students, even those who struggle with reading and writing.

A *blog,* short for *Web log,* is an online journal or diary. Blogs enable people to write and publish about anything that interests them, from politics to hobbies to entertainment. Celebrities and politicians often use blogs to keep in touch with the public and draw support. Conversely, relatively unknown writers have become famous through their blogs and transformed a hobby into a career by funding their writing with paid advertisements on their blogs. Many blogs are designed so that readers can post comments as well. Students can use blogs to practice writing, share ideas, and interact with their peers.

Grade Level(s):

8–12

Duration:

Ongoing (as long as instructor thinks is appropriate) sessions of 30–45 minutes each

Technology Prerequisites:

Student: Basic computer skills, including Internet use

Teacher: Basic computer skills, including Internet use

Student Goals:

- Understand the purpose and role of blogs for communication
- Develop self-expression and communication through blog entries and comments
- Improve reading and writing skills
- Improve computer skills

Curriculum Connection:

Literacy, language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

Imagine This!

A crowd of nearly 20 13- and 14-year-olds rush into the computer lab. They are eager to log on to their blogs to see what their classmates have written in response to earlier posts. After giving students some time to read responses, the instructor guides the group toward thinking about their next blog entries. They talk about the day's events to brainstorm ideas. One girl mentions an upcoming school dance, while a boy laments the amount of homework he has to do. Soon the students have turned to their computers and are busy drafting blog entries, occasionally discussing ideas with their friends. When the afterschool group meets again, students will have time to read one another's blog entries and post comments.

About Blogs

Blogs are a wonderful opportunity for students to express themselves. Before you begin, however, be sure to review your program's (or school's) Internet usage policy and safety guidelines. You'll also want to obtain parent permission if necessary (see www.netsmartz.org/resources for more information on Internet safety.)

For education and privacy purposes, consider Class Blogmeister (http://classblogmeister.com) or 21 Publish (www.21publish.com), two blogging tools that allow you to create multi-blogger communities where the instructor can review and edit student posts and comments before making them public. Other blogging sites like edublogs.org, blogger.com, or livejournal.com allow instructors to create accounts that can be viewed only by "friends" (other classmates) and the instructor.

For this activity, remember to do the following:

- Get parental permission.
- Know your school and district acceptable use policies (AUPs) and convey them to your students.
- Avoid blogging sites that require students to publish their complete names and/or e-mail accounts.
- Avoid sites that ask students for any personal information.
- Make students aware of what subject matter is appropriate and permissible.
- Teach students the importance of tone and respect for others' opinions.
- Have clear expectations, rules, and consequences.
- Remember that with risk comes growth and learning.[5]

What You Need

❒ Teacher computer with Internet access and projector
❒ Student computers with Internet access
❒ Examples of blogs bookmarked on each computer
❒ Student blog accounts
❒ Copy of Internet safety guidelines for each student

[5] www.educationworld.com/a_tech/techtorial/techtorial037print.shtml

- ❒ Signed parent permission forms if blogs will be viewed by public
- ❒ Student blogging software (optional)
- ❒ Digital cameras (optional)

Getting Ready

- Find some age-appropriate examples of blogs to show to students, such as Buster's Blog, which is based on the character of Buster from the PBS cartoon Arthur (http://pbskids.org/buster/blog/). You may want to conduct an Internet search for "student blogs" to find examples of other student work.
- Investigate whether your school has any firewalls that will prevent you from visiting these Web sites.
- Review current blogs from your local newspaper or television station.
- Decide on the purpose of the student blogs. Will they focus on changing or expressing opinions? Find and bookmark examples of different kinds of blogs.
- Practice posting blog entries, reviewing submissions (if this is an option with the blog host you use), and creating comments on entries.

What to Do

- Introduce the idea of blogs to students by asking them what they know about blogs and what blogs they like (if they are familiar with them).
- Show some examples of blogs you have bookmarked and look at some student suggestions (after making sure they are appropriate for school).
- After telling students that they are going to create their own blogs, review Internet safety guidelines.
- Brainstorm blog topic ideas as a class and make one practice entry as a group.
- Assign each student a blog account with the host you have chosen, and review the steps for creating and posting entries.
- Give students some time to write about whatever interests them. Once they have had some time to explore and become familiar with blogging, you can give them more structured assignments.
- Show students how to share blogs and post comments.
- After students have finished their blog entries, ask them to submit them to you for review.
- Once you have reviewed them for appropriate content, post the entries online.
- When the afterschool group meets again, ask students to read one another's blog entries and post comments.
- Many blogs will allow users to upload pictures and audio files or link to other sites. Once students have mastered blogging basics, show them some ways to personalize their blogs.

Extend

- Share blogs with parents, instructors, or students in another afterschool program.
- Consider making video blogs.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

Creating Podcasts

Creating podcasts allows students to experience the pleasure of sharing their work with an audience and to learn more about communicating through electronic media. While improving literacy skills, students also become more familiar with digital recording processes and other computer skills.

Grade Level(s):

4–12

Duration:

Five sessions of 45–60 minutes each

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

- Apply a wide range of strategies to comprehend, interpret, and appreciate texts
- Work collaboratively in small groups
- Research and write about current events
- Develop real-life, job-related skills
- Improve proficiency in reading aloud
- Use current technology software to create a podcast

Curriculum Connection:

Language arts

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

At a small table, a handful of fifth graders discuss newsworthy events of the week. They are preparing to write a script for a news show that they will record and turn into a podcast. After their scripts have been approved, the students take turns recording their news stories. The podcasts are made available for other students to listen to, and soon "Afterschool News" has become a popular program for students, parents, and teachers to listen to.

About Podcasts

A *podcast* is a form of audio broadcasting on the Internet (think radio). Most computers with Internet capability and access have a media player that will allow listening to a podcast. Instead of relying solely upon commercial media providers, individuals can create their own podcasts. Currently, there are three types of podcasts: (1) a basic podcast, which contains only audio and is the easiest to create and listen to; (2) an enhanced podcast, which has audio and slides (like a narrated PowerPoint presentation on the Web); and (3) a vodcast (or video podcast), which has with video and audio and is the most difficult to create and view. Although some podcasts are one-time productions (i.e., a student's lecture on art history), many podcasts are serial, with new episodes produced each day, week, or month.

One of the notable characteristics of a podcast is that listeners can subscribe to them and have their media players download new content automatically when it is made available. Podcasts were originally created with the intent of publishing several shows and making them publicly available.

For the purposes of this lesson, the instructor can determine whether students should create one or more podcasts and whether they should be published on the Internet to share with others or simply saved on afterschool computers for other students to listen to.

If you have never tried podcasting before, don't be afraid to ask someone, maybe an older student, to help you. This type of project will excite and motivate your students. Don't be surprised if you have a student(s) in your class who is already podcasting and can also help with the project.

What You Need

- ❒ Computer with Internet access and projector
- ❒ Podcasting software on at least one computer (i.e., Audacity, which is available at http://audacity.sourceforge.net/)
- ❒ Microphone for audio recording
- ❒ At least one computer with Internet access and word processing software for every team of students

Teaching Tip

Where Can You Listen to Podcasts?

You don't need a Mac or an iPod to create or listen to podcasts. Any computer with Internet access and a media player will do.

Education World explains it all with many excellent technology tutorials at www.educationworld.com/a_tech/archives/techtorials.shtml.

- ❒ Account on podcast hosting site if you intend to publish podcasts (optional). Consider sites such as the Education Podcast Network (http://epnweb.org), which is devoted to podcasting in education. Other free podcast hosts include http://studio.odeo.com and http://podcastpeople.com.
- ❒ Parent permission slips if podcasts will be published
- ❒ Adult or older student volunteers to help

Getting Ready

- If you have never created a podcast before, spend some time becoming familiar with podcasts.
- Find some podcasts to show to students as examples.
- Spend time practicing with computer audio player software, podcast recording software with microphone, and podcast hosting (if you will be publishing podcasts).

Teaching Tip

Podcasting Software

As podcasting grows in popularity, more user-friendly software is becoming available literally on a daily basis. At the time of this publication, two of the most popular audio podcasting software programs included Audacity (mentioned in the lesson) and Apple's Garage Band, for Mac computers. Many other programs, such as PowerPoint (by Microsoft) or Keynote (by Apple and only for Mac computers), allow users to save work as a movie or an Internet broadcast. Because the technology is always changing, spend some time exploring and asking colleagues (and students) what they use.

Session 1: Introducing Podcasts

What You Need

❒ Instructor computer with Internet access, audio player, and speakers

❒ Sample podcasts to show students

What to Do

- Introduce the idea of podcasts and determine students' familiarity with them by first asking students what they like to listen to on the radio. Point out that several radio stations make their programs available to download by posting them on the Internet. As the discussion moves to podcasts, provide examples of programs that are shows that are shared only through podcasts and not the radio.
- Once students have had time to discuss podcasts, tell them that they will be creating news podcasts for their afterschool program.
- Divide the class into small groups so that students can brainstorm ideas for their podcasts.
- Ask students to think of news covered on the radio and television and in newspapers to get story ideas. Topics can include news about their afterschool program or school; politics; sports events; interviews with students, afterschool staff, or community members; and opinion pieces.
- Ask students to write notes of their ideas to use when they write their scripts. They can also record their ideas in concept maps (diagrams that they can use to organize their thoughts).

> **Teaching Tip**
>
> **Remembering Copyright Law**
>
> Music can make a podcast more interesting, whether it's background music or an excerpt between news segments. If your students plan on using music or reading materials by other authors, be sure to review copyright laws.

Sessions 2 and 3: Writing Scripts for Podcast

What You Need

❒ Student notes or concept maps from discussions

❒ Student computers with word processing software and Internet access, one for each team

What to Do

- Divide students into the same small groups as before.
- Encourage students to consider factors beyond the content, such as the following:
  - How long each segment of the podcast should last
  - Order of presentation
  - Music excerpts to include between segments
- Have students e-mail you copies of their scripts so you can review them before they tape the audio.
- Monitor student writing to ensure that what they have written by the end of the session will provide appropriate material for their podcast.

Session 4: Recording the Podcast

What You Need

❒ One computer with projector, microphone, and podcasting software downloaded

❒ Scripts reviewed and ready to record

❒ Volunteers to help with technology and team management

What to Do

- Ask students to meet with their teams to practice reading the scripts out loud.
- Ask each team to designate a reader for its section of the podcast.
- With the help of volunteers, have students record their scripts.

Session 5: Publishing Podcasts (optional)

What You Need

❒ One computer with Internet access

❒ mp3s of student podcasts

❒ Podcast hosting account

❒ Volunteers to help with podcast

❒ Signed parent permission slips

What to Do

- Upload podcasts to the selected site (http://epnweb.org, http://studio.odeo.com, http://podcastpeople.com).
- Invite students, parents, and community members to listen to the podcasts.

Evaluation

- Evaluate the podcast with the students using the form from Kathy Schrock's Guide for Educators (http://school.discoveryeducation.com/schrockguide/evalpodcast.html).

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Practice 5

Learning in Virtual Spaces

What Is It?

Learning in Virtual Spaces focuses on activities that utilize technology tools such as the Internet, e-mail, and video conferencing to deliver "virtual" learning opportunities. This practice provides instruction for students who, separated by geography or other barriers, cannot meet face-to-face with peers, experts, or other audiences. Guided by specialists in their fields, students can make field trips to distant museums, watch expeditions to Mount Everest, and travel through space to Mars and the moon. Technology serves as a delivery vehicle for instructional activities in this practice.

What Is the Content Goal?

The goal of *Learning in Virtual Spaces* is to get students to use technology to collaborate and interact with others in remote places. Virtual field trips can easily be integrated into larger lessons to enhance social studies, history, science, or arts curricula.

What Do I Do?

Generate new project ideas or review existing ones, and determine their scope, requirements, and outcomes. Review online project registries to find projects that are available and appropriate to curriculum goals and your students' needs, skills, and interests.

Verify that you have the proper electronic connections and equipment to maximize the technology experience, and, if necessary, enlist the support of a knowledgeable support person. Carry out the activity and make adjustments as needed.

Remember that assessing student skills, time requirements, and computer resource needs is part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Why Does It Work?

Learning in Virtual Spaces works because the activities are engaging, intriguing, and highly motivating. Further, the technology used provides access to resources and instruction for students in a variety of locations and circumstances. Special needs, space, and time do not limit students' access to resources or instruction. This practice shows why the Internet has been described as a living, ever-changing resource for learning.

Getting Started

video

The best way to understand what is involved with an online project is to look at some existing projects. The following resources provide some of the best student project registries:

- Global Schoolhouse Network (www.globalschoolnet.org/GSH/)
- ePALS Classroom Exchange (www.epals.com)
- Intercultural E-mail Classroom Connections (www.iecc.org)
- International Education and Resource Network (http://iearn.org/projects/)

BEFORE YOU BEGIN YOUR RESEARCH, write down what concerns and questions you have regarding learning in virtual spaces.

AS YOU REVIEW DIFFERENT PROJECTS, consider the following:

How does the instructor work with the students to lay the groundwork for the activity and get them started?

What academic skills like reading, math, etc., would your day-school teachers like for you to enhance in afterschool activities? What opportunities did you find for online projects that would reinforce state learning standards?

AFTER YOU'VE FINISHED REVIEWING THE RESOURCES, consider what modifications you might need to make to involve your students in learning in virtual spaces.

Remember that assessing student skills, time requirements, and computer resource needs is also part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

Taking a Virtual Field Trip

On virtual field trips, you and your students explore the world through the World Wide Web and never leave the classroom. You and your students will visit a preselected Web site of a historic location like colonial Williamsburg or Ellis Island. Other Web sites are organized around a geographic theme, like exploring the Arctic, the Amazon rainforest, or even outer space. A simple virtual field trip might involve a photo tour with a short text explanation. The more sophisticated trips include audio and video guides, or even live interaction with a specialist in that field or someone playing the part of a historic figure. Some virtual field trips allow classes to just "drop in," while others require classes to register. Be sure to plan ahead before beginning your adventure.

Grade Level(s):

K–12

Duration:

Varies according to project or field trip

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

- Experience learning activities not otherwise available
- Enrich curriculum comprehension
- Increase appreciation of curriculum topic
- Inspire deeper insight into curriculum topic

Curriculum Connection:

All curriculum areas

National Educational Technology Standards Connection:

2: Communication and Collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving, and Decision-Making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

Afterschool students go on a safari, look at paintings at the Louvre, or swim with sharks. These adventures may sound impossible, but with the help of the Internet, students can have such experiences virtually. Imagine the excitement of your students when they interact through video conferencing, e-mail, or blogs with other students enjoying the same adventures as well as the guides who link them to the actual place or event.

What You Need

❒ Computer with Internet access and projector or interactive whiteboard

❒ Find the virtual field trip that your students can take to extend or enrich a specific lesson. Talk to your students' day-school teachers to see what topics they might like addressed with such an activity. Then go to the directories below to find the Web sites you need:

- Video Conference Adventures (www.kn.att.com/wired/vidconf/adventures.html)
- Favorite Video Field Trips (www.remc11.k12.mi.us/dl/fave/)
- TWICE Two Way Interactive Connections in Education (www.twice.cc/fieldtrips.html)
- Internet2 Museum Directory (http://k20.internet2.edu/)

Getting Ready

- Read the article "Virtual Field Trips: Why, Where, and How" at www.internet4classrooms.com/vft.htm.

Teaching Tip

If this virtual field trip is your first, consult with the technology coordinator for your program or for your program's feeder school. Show him/her the trip you're planning, instructions, and technology requirements. If he/she is available the day of the trip, you might want to ask him/her to attend your class. If you don't have access to a technology coordinator, ask an adult or older student volunteer to consult with you on this project. Be sure to have a back-up plan in place in case something should go wrong with the technology on the day of the virtual field trip.

Session 1: Take a Field Trip

What You Need

❒ Computer with Internet access and projector or interactive whiteboard

❒ Computer speaker with enough volume for entire class to hear

❒ Virtual field trip registration (if required) and the accompanying instructions regarding materials, preparation, and technology

What to Do

- Follow the instructions and information for your virtual field trip to engage your students in the activity.
- Visit places your students would not otherwise visit, see sites with them they would not otherwise see, and experience adventures with them they would not otherwise experience.

Session 2: Evaluate the Field Trip Experience

What You Need

❒ Instructor computer with projector

❒ Student computers with word processing software

❒ Writing materials

What to Do

- Ask students to write a journal entry describing their experience, explaining what they liked and what they did not like.
- Have students share their journal entries with one another and discuss the virtual field trip experience.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 2

Discovering the World Virtually

This lesson expands on the idea of virtual learning by extending projects across several sessions and allowing students to take part in adventure learning. This is a type of distance education where students use technology like the Internet and video conferencing to join real-time expeditions to remote and fascinating locations like the Arctic or the Amazon rainforest. Students observe daily activities and read field dispatches. Best of all, they can interact with real-world adventurers as they reenact, or even make, history.

Grade Level(s):

K–12

Duration:

At least 5–7 (numbers will vary)

Technology Prerequisites:

Student: Basic computer skills, including familiarity with the Internet

Teacher: Basic computer skills, including familiarity with the Internet, as well as experience in downloading files, video conferencing, and using webcams in live events. Knowledge of the content area covered in the project is also helpful.

Curriculum Connection:

Language arts, visual arts, social studies, science, and math

Student Goals:

- Engage in adventures and expeditions, working with scientists and researchers around the globe
- Use technology to watch events unfold, analyze resources, assist in answering scientific questions or problems, and participate in other real-time activities
- Use the Internet for investigation and study

National Educational Technology Standards Connection:

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

Imagine This!

An afterschool class of 15 gathers around a large projection screen to talk to a group of Arctic explorers. Students see for themselves what makes the Arctic unique. They get to know the people of the Arctic, such as the Samii of northern Finland, Sweden, and Norway. Together with the explorers and hundreds of other students around the world, they discuss and learn how what we do affects the Arctic environment and, consequently, the native people. Together they consider what they can do to protect that environment.

What You Need

❒ Instructor computer with Internet access and projector

❒ Student computers with Internet access

❒ Video conferencing equipment for live, interactive events

Getting Ready

- Select an ongoing or upcoming online expedition, such as one of the following:
  - Global SchoolNet Online Expeditions (www.gsn.org/expeditions/index.html)
  - The Jason Project (www.jason.org)
  - GoNorth! (www.polarhusky.com)
- Collaborate with your students' day-school teacher(s) to select an activity that supports the day-school curricula. If possible, have students help make the selection.
- If required, register the students in the activity.
- Some activities and accompanying curricula require a fee. If you want to participate in the popular Jason Project, for example, you will need to consider cost and revenue sources.
- Determine your technology and technical support or assistance needs.
- Review the expedition overview or guide and prepare any supporting materials needed.

  Review with your students the rules of online etiquette, called "netiquette," when interacting electronically with others. Guidelines for netiquette can be found on the Global Virtual Classroom Web site at www.virtualclassroom.org/tips/tips5.html or on Albion.com at www.albion.com/netiquette/corerules.html.

Session 1: Preparing for the Expedition

What You Need

❒ Computer with Internet access and projector

What to Do

- Engage students by asking them to imagine a friend on an adventure to China, in the ocean underworld, or climbing Mt. Everest. Then ask them if they'd like to share in the expedition or scientific exploration by receiving stories, photos, maps, and information. Even better, what if they could e-mail questions and answers to each other during the adventure?
- Continue by explaining that, thanks to the Internet, we can have unforgettable adventures in exotic places without ever leaving school. We can join real-time expeditions to far-away locations and observe daily activities and read field dispatches.
- Emphasize that this is a real-life experience occurring in real time, and as such, you have no idea what they may learn. Tell them that by the end of their expedition or exploration, they will be able to share their new knowledge in geography, history, science, math, language arts, and many other curricula areas with others.
- Introduce students to the expedition you're going to use. For example, you may choose GoNorth! because it has no participation fee. During this project, students meet with real scientists, explorers, and educators as an expedition team travels across the Arctic. GoNorth! expeditions begin in February and end in May; there will be expeditions in 2008, 2009, and 2010. If possible, allow students to be in on the decision of which expedition to take.
- Interactive video conferencing clearinghouses and provider lists are also available at the following Web sites:
  - Center for Interactive Learning and Communication (www.cilc.org)
  - Global Leap (www.global-leap.com/)
  - AT&T Knowledge Network Explorer (www.kn.pacbell.com/wired)

Sessions 2 and Beyond: Participating in an Online Expedition

What You Need

❒ Computer with Internet access and projector

❒ Video conferencing technology

What to Do

- Register for the online project of your choice.
- Plan ahead to ensure you have the technology you need on the day(s) you need, especially the days of live feeds from the expedition team.
- Take plenty of time to study the online expedition and its Web site. You'll find all kinds of resources, including curriculum materials and technology tutorials, on most expedition Web sites.

- Online expeditions have a variety of time periods. Some may be only one video conference lasting 45 minutes; others may last for months. Consequently, you will need to plan how you want to work the expedition into your ongoing afterschool curriculum.
- As with any technology integration unit, you will probably want to have at least one additional adult to help students and assist with classroom management. Try to find someone who has knowledge of the Internet and video conferencing.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Sharing Student Performances

This activity allows students to use video conferencing—technology that lets people at different locations talk to and see one another—to share a performance with a faraway audience. You and your students will select an activity for the students to complete and then plan a video conference so that students can perform it for others. As video conferencing equipment becomes more common in schools, churches, and businesses, finding a place from which you can broadcast or an appropriate virtual audience for your students should not be difficult.

Grade Level(s):

K–12

Duration:

Varies

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

- Engage and participate in a performance
- Become comfortable with the video conferencing process
- Understand the importance of practice and preparation for a performance

Curriculum Connection:

Language arts, dramatic arts, and music

National Educational Technology Standards Connection:

1: Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This

As part of an afterschool lesson, your students perform puppet shows, original dances, original monologues, and Shakespearean scenes with other students across the country. Students of all ages are motivated by the prospect of an audience beyond their classmates and are excited to see performances other young people will bring to them.

What You Need

❒ Video conferencing equipment

❒ Web sites with which to conference. The following Web sites include directories of classrooms and activities available for video conferencing:

- Global Leap (www.global-leap.com)
- AT&T Knowledge Network Explorer (www.kn.pacbell.com/wired)
- Center for Interactive Learning and Collaboration (www.cilc.org)

Getting Ready

- Contact teachers whose classes fit your time zone and age group. Ask them if they might be interested in teaching a lesson similar to the one you're doing that requires a student performance. You can direct them to the lesson on the Afterschool Training Toolkit. Suggest that your students perform for each other by using video conferencing technology.
- Choose any of the following lessons from the Afterschool Training Toolkit to use in your classroom:
  - Emotions in Motion (www.sedl.org/afterschool/toolkits/arts/pr_expressing.html)
  - The True Story of the 3 Little Pigs (www.sedl.org/afterschool/toolkits/literacy/pr_story_lit.html)
  - Shakespeare Club (www.sedl.org/afterschool/toolkits/literacy/pr_story_lit.html)
  - Meaningful Monologues (www.sedl.org/afterschool/toolkits/arts/pr_expressing.html)
- Reserve the video conferencing equipment for the day you will need it.
- Ask the technology coordinator for the video conferencing studio you're using to be available on the day you're planning to have your first video conference.
- Review what technology you will need for the conference.
- If you will be the one running the technology, practice with it ahead of time.
- Ask at least one older student or adult volunteer, preferably someone who is tech-savvy, to help on the day of the video conference.
- Be sure to have a lesson plan ready in case something happens with the technology or the class with whom you're conferencing on the day of the video conference. With technology in the classroom, there's a bit of advice that's really important: "Always have a plan B."

Session 1: Creating a Performance

What You Need

- ❒ Instructor computer with Internet access
- ❒ Afterschool Training Toolkit activities bookmarked on Internet browser
- ❒ Materials, props, music, etc. needed for performances

What to Do

- Engage students by asking them to tell you about television shows they have seen performed live. Tell them that they will have an opportunity to share a live performance for an audience through a video conference.
- If you have not already selected a topic from the ones listed above, present the choices to your students and guide them in selecting which one would be the best performance for their video conference.
- Give students time to rehearse their performance so that they are comfortable performing it for an audience.
- Enlist students' help in collecting props and costumes as needed.

Teaching Tip

Video Conferencing Equipment

Video conferencing equipment is more common than you might think. Talk to your afterschool program's feeder school administrator or technology director. If you have a college in your community, it may have a video conference studio. A call to your local chamber of commerce might provide insight into businesses that do video conferencing. Video conferencing can also be done with a small inexpensive camera, appropriate software, and a computer.

A basic overview of how to set up a video conference can be found on Ask Bruce (www.bbc.co.uk/webwise/askbruce/articles/video/videoconf_1.shtml), but the best thing to do is find someone who has done a video conference before to advise and direct you.

Session 2: Video Conference Performance

What You Need

- ❒ Student performers ready to go
- ❒ Materials, props, music, etc.
- ❒ Video conferencing equipment
- ❒ Selected audience to watch students' performance via video conference
- ❒ Adult or older student aides
- ❒ Technology assistant

What to Do

- Help students put on their performance. This the culminating piece of this lesson. Up until this point you have followed the lesson plan, and now your students are ready to perform.
- Reassure students that the young people on the other end may be a bit anxious, too. Remind them to have fun!

Vocabulary

A **webcam** is a camera, usually a video camera, whose images can be accessed using the World Wide Web, computer video conferencing applications, or other forms of Internet communications technology. On WebCam Central (www.camcentral.com/), you can see live pictures from all over the world and search for topics, such as zoos.

Session 3: Evaluate Video Conference

What You Need

- ❒ Instructor computer
- ❒ Student computers with word processing software
- ❒ Writing materials

What to Do

- Ask students to write a journal entry evaluating their video conferencing experience. Suggest they write about what the performance was, what they liked about the experience, and what they would do differently.
- Share journal entries and discuss the video conference.

Teaching Tip

Remember to Do a Tech Trial Run

Before your students meet to perform, be sure to test all of the equipment with a helper checking at the remote location. This way you will avoid technical difficulties during the live performance.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 4

Ask an Expert

With only one computer and Internet access, you can provide your students with homework help and technology experience. Using the best "ask an expert" Web sites, set up a cyber study center where students ask online experts questions related to their homework assignments. In your ongoing conversation with your students' day-school teachers, ask which topics students should discuss with the experts.

Grade Level(s):

2–12

Duration:

Ongoing

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills

Student Goals:

- Complete and turn in homework on time
- Correctly address homework instructions
- Evaluate information provided from online sources
- Express questions in writing accurately and responsibly

Curriculum Connection:

Math, science, language arts, and social studies

National Educational Technology Standards Connection:

2: Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

3: Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

It's homework time in the afterschool program. As students get out their books and notebooks, two eighth-grade boys gather at a computer to get help with their math homework. They are struggling with a geometry problem on perimeter. After logging on to a math mentoring Web site, they search the forum archives for questions and answers about perimeter. They find some messages that help them answer most of their problems but remain stumped on two questions. They post questions to the online math expert and log on the next day to see what responses they have received.

What You Need

❒ Instructor computer with Internet access and projector

❒ Student computer with Internet access

Getting Ready

- Look over the following "ask an expert" Web sites:
  - Pitsco's Ask an Expert (http://askanexpert.com)
  - Ask Dr. Math (http://mathforum.org/dr.math/dr-math.html)
  - The Math Tutor (www.fliegler.com/mathman.htm)
  - Ask Dr. Universe (www.wsu.edu/DrUniverse/Contents.html)
  - Ask the Grammar Lady (http://aacton.gladbrook.iowapages.org/)
  - Jiskha Homework Help (www.jiskha.com/)
  - AllExperts (http://allexperts.com)
  - Infoplease Homework Center (www.infoplease.com/homework/hwhelper.html)
- Arrange for an adult or older student volunteer to assist students with the "ask an expert" process.

Session 1: Getting Ready

What You Need

❒ Instructor computer with Internet access and projector

❒ Bookmarked list of "ask an expert" sites

What to Do

- Tell your students that you are going to show them how to find answers to their most challenging homework questions.
- Show students the list of "ask an expert" Web sites and how to access those sites.
- Review rules on asking a question that are common to most of these sites, such as those found on Pitsco's Ask an Expert (http://askanexpert.com).
- Remind students these experts will not do their homework for them but are resources to help them do their own work and to learn from that effort.
- At the middle school and high school levels, students may consult these experts as resources for a paper or project. Remind them to cite these people's contributions as appropriate.
- You will want also to review your program's or school's Internet usage policy and rules and post a copy close to the student computer.

Teaching Tip

When to Ask an Expert

As you implement your "ask an expert" online homework help program, take some time to consider how it will fit into your existing homework sessions. If you will have a limited number of computers available for online help, you might consider having a sign-up sheet.

For more information about homework help in afterschool, see the homework help section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/homework/index.html.

Sessions 2 and Beyond: Asking Experts

What You Need

❒ Student computer(s) with Internet access and bookmarked list of "ask an expert" Web sites

❒ Adult or older student aide

What to Do

- Have the students consult experts for help with their homework using the "ask an expert" Web sites.
- If several students have the same question, allow them to work as a team to get an answer from the experts.
- Assign an aide to this station to monitor and help.

Extend

If you have more than one computer available for student use, you may want to broaden the scope of your "cyber study center." Stock an additional computer with appropriate, high-quality learning activities. Check with day-school teachers to see if computer enrichment games are available with the textbooks students are using during the school day. Additionally, Web sites such as Fun Brain (www.funbrain.com) and Gamequarium (www.gamequarium.com) provide links to many fun, free online learning games.

Another helpful addition to this center would be a computer dedicated to homework sites such as B.J. Pinchbeck's Homework Helper (www.bjpinchbeck.com/alphabeticallist.html), Homework Spot (www.homeworkspot.com), and Kidbibs Homework Help (http://kidbibs.com/homeworkhelp.htm). These sites have links to great homework resources such as almanacs, dictionaries, and style guides.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

Visualizing Math With Virtual Manipulatives

Understanding math is easier for students when they can manipulate physical objects to help them visualize a problem or relationship. Now we can use computers to provide a virtual environment where it's possible to do pretty much the same thing. Using online math manipulatives will engage your students so that they can enjoy success in math.

Grade Level(s):

K–12

Duration:

At least 15 minutes per session

Technology Prerequisites:

Student: Basic computer skills
Teacher: Basic computer skills

Student Goals:

- Visualize math relationships
- Increase math skills
- Apply math concepts

Curriculum Connection:

Math

National Educational Technology Standards Connection:

6: Technology Operations and Concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

Your afterschool students are using geoboards, but no one is shooting rubber bands at anyone. Another group is working with tangrams, but no pieces are missing. These students think they're simply playing computer games, but they're actually improving their math skills and having fun with virtual math manipulatives. Geoboards and tangrams are only two examples of dozens of math manipulatives your students can use online at no cost to your program.

What You Need

- ❒ Instructor computer with Internet access, Java-enabled Web browser, and projector
- ❒ Student computers with Internet access and Java-enabled Web browsers (at least one computer for every two students)
- ❒ Sources for virtual manipulatives:
  - National Library of Virtual Manipulatives (http://nlvm.usu.edu/en/nav/vlibrary.html)
  - Using Virtual Manipulatives on the Web to Develop Number Sense (http://mason.gmu.edu/~mmankus/talks/nctm2000/nctmch00.htm)
  - Illuminations Student Activities (http://illuminations.nctm.org/ActivitySearch.aspx)

Vocabulary

Manipulatives: hands-on tools that allow students to move objects so that they can see how a mathematical concept works

Base 10 Blocks: typically used to represent units of 1, 10, or 100; can help students understand concrete quantities, decimals, and other mathematical concepts

Geoboard: a set of pegs in a square pattern on which rubber bands are placed to explore geometric concepts

Pentominoes: the 12 sets of shapes created by combining 5 squares or cubes, with faces touching each other, in every possible combination

Polyominoes: shapes formed by connecting equal-sized squares, each joined together with at least one other square along an edge (for example, a domino has 2 squares; a pentomino has 5 squares)

Tangram: a math puzzle consisting of 7 pieces (tans) that fit together to form some kind of shape; the idea is to create shapes from the 7 tans without overlapping any of the shapes

What to Do

- Talk to your students' day-school teachers to find out which math concepts you should focus on in your afterschool program. Tell the teachers that you are interested in your afterschool students trying virtual manipulatives to increase their math skills. Show them your resources for manipulatives and ask for their suggestions.
- Review virtual manipulatives on the sites listed above. Look for ones that address math skills that the day-school teachers feel need attention as well as ones that enhance other math activities you have planned, such as those in the math section of the Afterschool Training Toolkit (www.sedl.org/afterschool/toolkits/math).
- To get a better idea of how to integrate a manipulative into a lesson, work through one of the lessons below from the Afterschool Training Toolkit and consider how the virtual manipulative would enrich the lesson:
  - Finding Pentominoes. Include a center where students use the polyominoes manipulative in the National Library of Virtual Manipulatives (NLVM) to find pentominoes.
  - Measuring Hands and Feet. Try the geoboard manipulative found in the NLVM to help students reach their learning goals regarding measurement.
  - Using Gift Certificates. The "teaching tip" in this lesson suggests using base 10 blocks, and you can do so with the base blocks manipulative in the NLVM.
- Project the manipulative onto a large screen or interactive whiteboard. Go through the instructions with students and demonstrate how it works, perhaps asking for volunteers to come to your computer to try it. Keep in mind that your students will probably view manipulatives as a game. In fact, that's a good way to approach the integration of manipulatives into your afterschool class.
- Depending on the number of computers you have, give each student a chance to work through the activity. If you only have one or two computers, you may want to set up a manipulative math center through which students rotate during the afterschool program.
- If applicable, individualize math tutoring using manipulatives to address each student's math needs.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Practice 6

Building Skills and Understanding

What Is It?

Building Skills and Understanding focuses on student learning through the use of educational computer games, puzzles, simulations, electronic books, tutorials, and other forms of programmed instruction. Activities typically involve the student learning "from" a computer that is connected to the Internet or running a program designed to remediate or build skills in a specific content area. This practice can directly or indirectly support learning objectives for even the youngest students.

What Is the Content Goal?

Learning goals for this practice are tied directly to specific content areas. This practice offers learning opportunities for students at various age and ability levels, including English language learners and non-reading students.

What Do I Do?

Consulting first with the day-school teacher to determine students' needs increases successful outcomes of this activity.

Review computer programs available to you, and determine if they are appropriate to your students' needs. Refer to Guidelines for Choosing Appropriate Games, Puzzles, and Tutorials on page 207. Consider content, age range, equity, appropriateness, format, language, technical requirements, reviews, cost, and licensing. Select the best game, puzzle, or tutorial based on students' needs and skills as well as overall curriculum goals.

Assessing student skills, time requirements, and computer resource needs is also part of the planning process. Consult the Pre-Project Planning Inventory on page 205.

Why Does It Work?

Building Skills and Understanding works because computer-based learning can accommodate students in a variety of situations and with different learning styles and needs. Research is not conclusive regarding claims that computer-based learning increases math skills or other content area skills. However, used appropriately and with instructional intent, this type of learning can benefit many children.

Use of computer-based applications in afterschool settings must be intentional, selective, and in moderation. That is, it must be purposeful and focused on instructional goals. Because some students can become disengaged, distracted, or overstimulated by computer activities, carefully monitor students and time spent at the computer. Do not allow students to become bored. Some computer-based activities, such as games and puzzles, exert a magnetic attraction for some children. Have students reflect on their learning and plan a follow-up activity.

Getting Started

As the instructor, you play an important role in determining how effective computer puzzles, games, and tutorials are in *Building Skills and Understanding.* Fortunately, planning for these activities can be fun as you become familiar with educational games. Spend some time exploring one of these Web sites: PBS Kids games (http://pbskids.org/games/index.html) for younger elementary students or Discovery Education Learning Adventures (http://school.discoveryeducation.com/students/) for middle elementary and older students. As you try some of the games and activities, answer the questions below.

TECHNOLOGY. What types of technology will you need for these activities? Will you need to download any software plug-ins or other applications before students can participate?

PREPARATION. What will you do to prepare for a session where students participate in these games and activities? Is there anything you will need to prepare ahead of time?

STUDENT ENGAGEMENT. How long do you think students will remain engaged in these activities before losing interest? Is there anything you can do to help them stay focused?

ACADEMIC ENRICHMENT. Is there anything you need to do to make these activities enriching and educational rather than unstructured playtime? How can you make the activity educational but still keep it fun?

CLASSROOM MANAGEMENT. What sort of classroom management strategies will you use for an activity like this? Do you think you would rather have students work alone or in pairs?

Remember that assessing student skills, time requirements, and computer resource needs is also part of the planning process. Refer to the Pre-Project Planning Inventory on page 205.

Lesson 1

Learning With Puzzles and Games

In this lesson, students play online puzzle games that challenge their knowledge of U.S. and world geography. The puzzles, which vary in difficulty, engage students in a new learning experience that enriches this subject area.

Grade Level(s):

Grades 3–12

Duration:

One or two 1-hour sessions

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

- Build new or strengthen current academic content skills
- Learn new concepts
- Enrich prior knowledge

Curriculum Connection:

Varies, depending on the academic content

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

6: Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations.

Imagine This!

A class of fifth graders is using technology to learn about U.S. geography. Through a series of online games, they learn states, capitals, geographic regions, lakes, rivers, and more. Their parents and teachers are impressed with how the students' knowledge of U.S. geography has improved. They are also amazed that the students now look forward to studying geography.

What You Need

❒ Instructor computer and projector (optional)

❒ Student computers with Internet access (one for every two students)

Getting Ready:

- Test the student computers and Internet access.
- Familiarize yourself with the following online geography puzzles and games:
  - U.S. geography games (www.sheppardsoftware.com/web_games.htm). Choose from several puzzles to identify states and state capitals.
  - Test Your Geography Knowledge puzzle (www.mccollam.com/fun/geoquiz/). This is a point-and-click activity that provides several quizzes on all regions of the world.
- If possible, determine in advance student familiarity with the technology you plan to use and their technology skill level.
- Plan the sequence of activities, how you will introduce the activity, and how students will be paired.
- Anticipate how many sessions it will take to accomplish your instructional goals.
- Engage assistance from another instructor, parent, or other adult.
- Decide whether you want to supplement the lesson with another activity (for example, teaching students about longitude and latitude).

Session 1: Introducing Geography Puzzles

What You Need

❒ Instructor computer with Internet access and projector

❒ Student computers with Internet access

What to Do

- Engage students by telling them that they will be taking a virtual trip around the world via online puzzle games that will challenge their geography knowledge.
- Show students how to access and play the games using the projector, or you and an assistant can demonstrate the game in small groups.
- Give students time to explore the games individually or in pairs. You can choose the specific geography game, or the students can choose their own.

Session 2: Students Build on What They Learn

What You Need

❒ Instructor computer with Internet access and projector

❒ Student computers with Internet access

What to Do

- At the beginning of this session, ask students to share what they learned in the first session. How many states and state capitals were they able to correctly identify? How quickly were they able to do it?
- Allow students to play the games again and see if they can improve their efforts. Ask students to evaluate their own efforts. Are the puzzles too easy or too difficult? Are they challenging or boring?
- Have students brainstorm some different ideas for learning U.S. states and state capitals and their locations. Ask them what other countries they could learn about. Can they locate their own state, state capital, and hometown on one of the puzzle maps or on a paper map?

Extend

- If learning latitude and longitude is appropriate for the grade/age level of your students, continue with some of the following lessons in this practice to help students better understand that concept.
- If students are interested in other topics such as birds, animals, science, and math, choose other games and puzzles from www.sheppardsoftware.com/ or www.gamequarium.com.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 2

Learning Concepts With Simulations

This lesson helps students learn navigational concepts like longitude and latitude, initially using paper maps and later with a "virtual globe," a simulation program called Google Earth.

Grade Level(s):

Grades 3–12

Duration:

One or two 1-hour sessions

Technology Skills Prerequisites:

Student: Basic computer skills; some basic geography and math knowledge

Teacher: Basic computer skills, including familiarity with the Internet; basic geography knowledge

Student Goals:

- Increase knowledge of geography, including geography terms
- Increase map reading skills
- Enhance computational and problem-solving skills

Curriculum Connection:

Geography, math, and literacy

National Educational Technology Standards Connection:

3: Research and Information Fluency
Students apply digital tools to gather, evaluate, and use information.

4: Critical Thinking, Problem-Solving, and Decision-Making
Students use critical thinking skills to plan and conduct research and solve problems.

Imagine This!

After becoming familiar with navigational concepts and terms like longitude and latitude, a classroom of students learns to find locations on the earth with Google Earth. This application lets the navigator zoom in on various locations around the Earth and actually have a close-up view of the landscape below. Students can fly to their houses; they simply type in their address, press "search," and zoom right in. They search for driving directions to schools, parks, restaurants, and hotels. Once they find their desired location, they tilt and rotate the view to see 3D terrain and buildings or look up to explore the sky.

What You Need

- ❒ Instructor computer with Internet access and projector
- ❒ Student computers with Internet access
- ❒ Google Earth software installed on computers (available free at http://earth.google.com/index.html)
- ❒ Chart paper or whiteboard
- ❒ Paper maps of your city, your state, the United States, and the world
- ❒ Copies of Handouts 7, 8, and 9 for students

Getting Ready

- Review and prepare printed materials for students.
- Review latitude, longitude, and other navigational concepts.
- Review and practice with Google Earth software.

Teaching Tip

About Google Earth

Google Earth combines a powerful search engine with satellite images. You can visit locations by typing in complete addresses, names of cities, or even directional coordinates. Review the user's guide at http://earth.google.com/userguide/v4/ and decide which features you want to show your students.

Session 1: Introduction to Geography Terms

In this session, you will introduce students to map reading and geography terms and have them work from a paper map with lines of latitude and longitude.

What You Need

❒ Paper maps of your city, your state, the United States, and the world

❒ Chart paper or whiteboard

❒ Handouts 7, 8, and 9

What to Do

Part 1

- Open this session by posing the following questions to the students:
  - How do you know the names and places on a map?
  - How did you find your way here today?
  - How do you find a new place like the home of a friend, a new restaurant, or a new store?
- Help students draw the conclusion that they must have some sort of navigational system to find their way.
- Write "navigational system" on chart paper or the whiteboard, and explain that the focus of this activity is to learn more about navigational systems and ways for students to find their way around the world.

Part 2

- Take out a (paper) map of the city and point to where your school (or afterschool center) is located. Ask if anyone would like to locate his or her house on the map.
- Show a larger (paper) map of the United States and ask students to locate their city and state on the map. Then ask students to locate other cities east, west, north, and south of their city. Have students point out these different places on the map.
- Ask students to define the terms east, west, north, or south and explain how they know when to go east, west, north, or south.

Part 3

- Introduce the following scenario to dramatize and emphasize the significance of having a navigational system:

  "Imagine yourself in the year 1600. You are in a tiny creaking wooden ship, sailing away from land. All your familiar landmarks slowly disappear from sight. All you see in any direction is water and sky. How will you know where you are? How will you find your way to a small island thousands of miles away on the other side of this vast ocean?"
- Once students have had a chance to respond, continue with the following:

  "Now that we don't live in the year 1600, how do airline pilots, astronauts, weathermen, and ship captains pinpoint locations and find directions on the Earth's surface?"
- After students have responded, continue with the following:

  "There's a system that's centuries old but still used today for ocean navigation, as well as for air travel and for using high-tech satellites to pinpoint locations. This system uses

invisible lines called latitude and longitude. When you look at your map, you will see lines across and lines down. Have you seen those lines on maps and globes before?"

- Distribute Handout 7 ("World Map: Cylindrical Projection") and Handout 8 ("Earth Navigation Guide") to students.
- Using the handouts or a larger map, explain latitude, longitude, equator, prime meridian, and degrees, encouraging students to write notes on their handouts.
- Give students time to complete some of the activities on Handout 8 (optional).
- Use chart paper or a whiteboard to make a vocabulary list that you can add to as the activity progresses and as participants mention new ideas and definitions.
- Encourage students to think of ways navigation might be a part of their everyday life, such as in hiking, fishing, and hunting. What kinds of jobs require these skills everyday?

Session 2: Navigating the Earth With Google Earth

What You Need

❒ Instructor computer with Internet access and projector (optional)

❒ Student computers with Internet access

❒ Google Earth application on instructor and student computers

❒ Materials from the previous session

❒ Copies of Handout 9 ("Where in the World? A Geography Challenge") for you and your students

Preparation

- Study the instructions for Handout 9 and try out the challenges yourself.
- Practice with Google Earth.

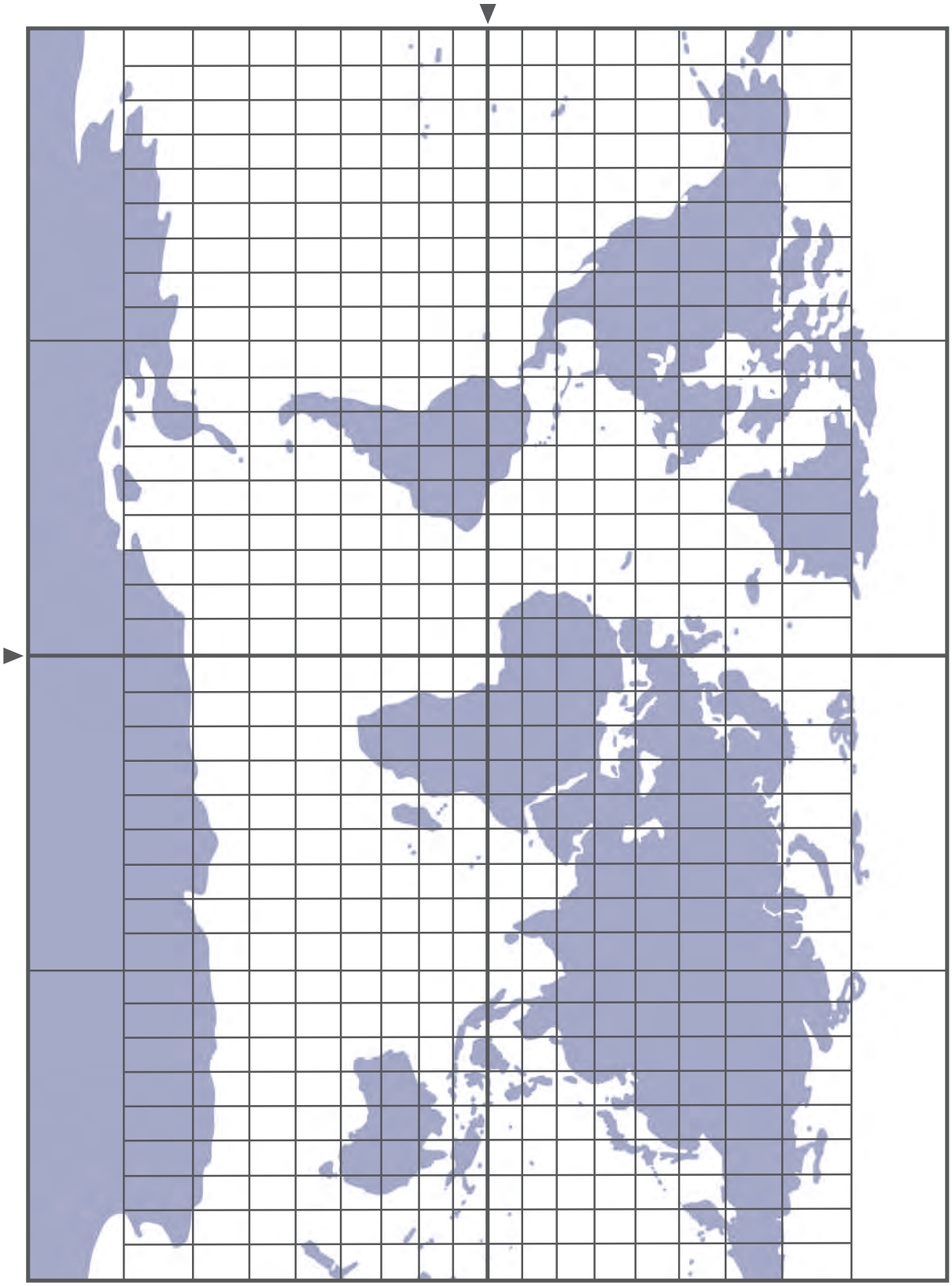
What to Do

- Show students how to launch Google Earth and use the following features:
  - Address bar (to visit different locations)
  - Zoom feature (to look at locations more closely)
  - Location icons (for cities) and camera icons (for photos)
  - Navigation compass (to move north, south, east, and west)
  - Coordinates bar (at the bottom of the screen)
- Once the demonstration is complete, have students explore and use Google Earth.
- Review navigational concepts and terms from session 1 and answer questions.
- Distribute Handout 9 and review the instructions with students.
- Show students how to answer the first question and bonus. Allow students to continue working, either alone or in pairs.

Extend

To extend this lesson, students can learn to use global positioning system (GPS) handheld units to find and document locations. See the lesson, "Hide and Seek with Geocaching," on page 82 for lesson ideas.

Handout 7: World Map: Cylindrical Projection (10-degree increments)



Handout 8: Earth Navigation Guide

Getting Started

Use this guide to review key concepts regarding Earth navigation. Reference Handout 7 (World Map: Cylindrical Projection) or any other global map when reviewing these terms.

This map divides the Earth's surface into 10-degree increments. You can manually estimate latitude and longitude locations from this map.

You can use this map to calculate the degrees north/south/east/west for navigating to different sites around the world.

Terms to Know

The Earth's circumference is divided by the following lines:

Longitude: the lines that go north and south from the North Pole to the South Pole

Latitude: the lines that go around the globe parallel to the equator

The **prime meridian:** the point of reference from which east or west longitude is calculated; runs north/south through Greenwich, England. Longitude is expressed as 0–180 degrees east or west (of the prime meridian).

The **equator:** the point of reference from which north or south latitude is measured; runs east/west. Latitude is expressed as 0–90 degrees north or south (of the equator).

Find and mark the equator and the prime meridian on the map.

Exact positions on the globe are calculated by the intersection of a line of latitude with a line of longitude.

0° longitude and 51° N latitude is the location of Greenwich, England. This is the location of the Greenwich Observatory, where the concept of longitude was invented.

Check Your Understanding

Is North America located **north** *or* **south** latitude and **east** *or* **west** longitude?

Is Australia located **north** *or* **south** latitude and **east** *or* **west** longitude?

How far is it between the lines of latitude and longitude?

- The distances between lines of latitude and longitude are not expressed in terms of miles but in terms of **degrees.**
- The circumference of the Earth is measured in degrees. Because it is a complete circle, the Earth's circumference is 360 degrees.

Earth's movement

- We know that the Earth moves as it rotates. How many degrees does the Earth move in an hour? Hint: The Earth rotates a full 360 degrees in 24 hours, so 360 / 24 = 15. Therefore, the Earth rotates 15 degrees every hour between each line of longitude.

Handout 9: Where in the World? A Geography Challenge

Getting Started
Find your house: Type your address in the "Fly to" box in Google Earth. Click on the magnifying glass. When the image appears, zoom in closer if you want. To find the coordinates, look at the bottom left of the aerial view displayed. *Tip:* You need only the first four digits after "Pointer" (for example, 30°16´N and 97°44´W). Be sure to include both coordinates (N or S; E or W). *What are your coordinates?*
Find the capital city of your state using Google Earth. *What are the coordinates?* *Optional bonus activity:* Plot those coordinates on the cylindrical projection map.
First stop: New York City. *What are the coordinates?* *Optional bonus activity*: Plot those coordinates on the cylindrical projection map.
Second stop: Juneau, Alaska. *What are the coordinates?* *Optional bonus activity*: Plot these coordinates on the cylindrical projection map.

Third stop: Sydney, Australia.

What are the coordinates?

How are these coordinates different from the previous stops? *Hint:* Australia is in the southern hemisphere, and up until now, you've been navigating in the northern hemisphere.

Optional bonus activity: Plot these coordinates on the cylindrical projection map.

Final stop: North Pole. Type in the following coordinates: 90° N, 90° E. When the satellite completes its move, increase your altitude. Where are you? Change the coordinates to 90° N, 90° W. Now where are you?

Optional bonus activity: Plot these coordinates on the cylindrical projection map.

Bonus challenge: Find the coordinates for Greenwich, England.

Now calculate the coordinates that will rotate the Earth ahead 6 hours from Greenwich. *Hint:* How many degrees does the Earth move ahead in 1 hour?

Record those coordinates on this worksheet.

Bonus challenge answer

The Earth rotates a full 360 degrees in 24 hours, so the Earth rotates 15 degrees in 1 hour (360 / 24 = 15). Therefore, in 6 hours, the Earth will rotate 90 degrees (15 x 6 = 90). The longitude must be changed 90 degrees in order to rotate the earth by 6 hours. Because the Earth rotates in a counterclockwise direction, you can add 90 degrees to longitude west or subtract 90 degrees from longitude east.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 3

Learning With Tutorials

You can increase both students' content-area knowledge and technology skills with this computer arrangement. Using age-appropriate tutorials from the Internet, CDs, and DVDs, you can set up a study center where students learn from tutorials. In your ongoing conversations with your students' day-school teachers, ask which content areas students need the most help with (literacy, math, science, etc.).

Grade Level(s):

All

Duration:

Ongoing

Technology Prerequisites:

Student: Basic computer skills

Teacher: Basic computer skills

Student Goals:

- Develop individual skills and increase knowledge with computer-based resources
- Evaluate information provided from online sources

Curriculum Connection:

Math, science, language arts, and social studies

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

In an afterschool class, each of the students needs individual help with his or her learning. The schedule and class size make it difficult to tutor each student individually during the afterschool session. However, the class has access to two computers, one with Internet access and the other without Internet access. The class also has access to the school library computers.

What You Need

❒ Student computers with Internet access and/or computers with multimedia capability

Getting Ready

- Discuss students' needs with day-school teachers to determine the most appropriate tutorials. When selecting tutorials, consider content, age and gender appropriateness, and compatibility with your computer and operating system. See Guidelines for Choosing Appropriate Games, Puzzles, and Tutorials on page 207 for more information.
- If you do not have a tutorial selected, consider some of the following free Web sites:
  - Learn4good Kids' Area: Free access to hundreds of educational games, activities, worksheets, and lessons (www.learn4good.com/kids/index.htm)
  - Pitsco's Ask an Expert (http://askanexpert.com)
  - Ask Dr. Math (http://mathforum.org/dr.math/dr-math.html)
  - The Math Tutor (www.fliegler.com/mathman.htm)
  - Ask Dr. Universe (www.wsu.edu/DrUniverse/Contents.html)
  - Ask the Grammar Lady (http://aacton.gladbrook.iowapages.org/id3.html)
  - Infoplease Homework Center (www.infoplease.com/homework/hwhelper.html)
  - Disney.com (includes information about Internet safety) (http://disney.go.com/webtoons/threepigs)
  - Beginners English Course (www.english-online.org.uk/course.htm)
- Review your program's or school's Internet usage policy and rules and post a copy close to the student computers.
- Once you have made your selection, prepare the computers for the students.
- Arrange for an adult or older student volunteer to assist students during this activity.

Teaching Tip

Software Reviews

When you are selecting tutorial programs, you can benefit from other educators' experiences by reading software reviews in magazines like *Children's Technology Review* (www.childrenssoftware.com). This publication is available by subscription both online and in print and is a must for keeping current on the technology available for your students.

Sessions 1 and Beyond: Accessing Tutorials

What You Need

❒ Computers with Internet access and appropriate software loaded or Web sites bookmarked

What to Do

- Direct students to the appropriate computers. Explain the focus of the activity.
- Show students how to access the sites you have selected and use the tutorials.
- If several students have the same instructional need, consider allowing them to work as a team.
- Monitor the time they spend working on these tutorials. Help students stay focused on the tutorials and use Web sites appropriately.

Extend

Check with day-school teachers to see if computer enrichment activities are available as part of the supplementary textbook materials students use during the school day.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 4

Engaging Readers and Writers With Interactive Whiteboards

Interactive whiteboards can be used for a variety of instructional activities in afterschool. This tool uses a computer connected to a projector and a touch-sensitive whiteboard. The projector displays images from the computer, which is controlled by touching the board with an electronic pen or a finger. Teachers can display Web sites, run educational software, show a video, or give multimedia presentations to engage students in interactive learning.

This method of delivery of instruction provides an opportunity to actively engage students in a variety of ways, from planning stories to reinforcing skills and learning new concepts. Students are able to move images, click on links, and activate sounds and movies with a simple tap or drag of a pen, and the rest of the class can see and hear the results. Students engage in collaborative problem-solving activities as they work together.

Grade Levels:

All

Duration:

One 45-minute session or more, depending on the topic

Technology Prerequisites:

Student: Basic computer skills, including familiarity with the Internet

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

Reinforce skills and concepts in all content areas

Curriculum Connection:

All

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

A group of students is actively engaged in learning new concepts by interacting with digital images floating across a large whiteboard at the front of the classroom. The students reach up and touch the board to select and match words and definitions with images. They coach one another and read aloud together the resulting text on the screen. They also coach one another while manipulating puzzles displayed on the whiteboard.

What You Need

❒ A computer connected to a whiteboard. Internet access will provide additional educational programs that can be used with the whiteboard setup. If your program or school does not have a whiteboard setup, you can purchase one of the following:

- ACTIVboard by Promethean (www.mypromethean.com/uk/)
- SMARTBoard by Smart Tech Inc. (http://smarttech.com)

Promethean and Smart Tech Inc. also provide access to materials and resources that you can use in your classroom.

Getting Ready:

- Consult with the day-school teacher for suggestions on what types of games and activities would be most beneficial to students and then select computer tutorials, games, puzzles, and videos that are appropriate to your students' needs.
- Check resources that might be available at your school either in the library or with a day-school teacher.
- Read Guidelines for Choosing Appropriate Games, Puzzles, and Tutorials on page 207 before making your final choice.
- Read the following online report prepared by three educators who have used the interactive whiteboard as an instructional tool: *Interactive Whiteboards for Interactive Teaching and Learning* (www.techlearning.com/story/showArticle.php?articleID=169400643).
- Test and practice with the whiteboard equipment. Plan a simple first activity so that you and your students can become proficient with the equipment.

Session 1: Read Aloud

This lesson shows how you can implement the reading strategy called read aloud. You can learn more about this strategy in the literacy section of the Afterschool Training Toolkit at www.sedl.org/afterschool/toolkits/literacy/pr_read_aloud.html.

What You Need

❒ Computer with Internet access, projector, and interactive whiteboard

❒ Online e-story to read (you can select one from the International Children's Digital Library at www.icdlbooks.org)

What to Do

- Display the title and book cover on the whiteboard screen. Note the author, illustrator, plot summary, and any new vocabulary words.
- Based on the book's title, ask for predictions of what might happen in the story.
- Read the book aloud while displaying the story on the whiteboard, pausing to ask questions.
- Pause often to check for understanding. Invite predictions as the story progresses. Have students look for visual clues.
- Check the whiteboard display of the story pages for additional arrows to click. Graphics are commonly used to illustrate words and concepts in an online story.

Session 2: Reviewing the Story

What You Need

❒ Materials from previous session

❒ Whiteboard and computer setup

What to Do

- Use the interactive whiteboard to list the elements of the book (cover, story, pictures) and discuss who does each job (publisher, author, illustrator).
- Place digital pictures or names of the main characters on the screen and have students touch and move them around to construct an outline of the story.
- Ask additional questions such as: What do writers do? How do you think they get ideas for stories? Which do you think comes first—the story or the pictures? Do you like to write? Have you ever written a book before? Would you like to? Make the key point that writing is a process and good writers write what they know and care about.

Session 3: Writing Collaboratively

What You Need

❒ Materials from previous session

❒ Whiteboard and computer setup

What to Do

- Explain to students that they are going to revise the story they hear.
- On the whiteboard, display several key words, partial sentences, and phrases from the book you just read. These phrases will be used as idea generators to "rewrite" the ending or some portion of the book.
- Ask for student volunteers to touch and move the words and phrases around to create a different story.
- Discuss with students how simple changes can make a big difference.

Extend

- Ask students to choose an idea for their own book. It can be related to the book that is read aloud or simply something that's important or interesting to them.
- Have them first create an outline and then add two possible endings.
- If time permits, students can write their stories with a word processor and include digital images.
- When students feel their books are complete, display them or create an opportunity for them to share with parents, teachers, and/or other students.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

Lesson 5

Using Logic Games With Interactive Whiteboards

Projecting games onto whiteboards makes it easier for students to work in groups. Because students can move images by touching the whiteboard, tactile learners may find it easier to understand spatial relationships. You can read more about interactive whiteboards in the introduction to lesson 4, "Engaging Readers and Writers With Interactive Whiteboards."

Grade Levels:

All

Duration:

One 45-minute session or more, depending on the topic

Technology Prerequisites:

Student: Basic computer skills, including familiarity with the Internet

Teacher: Basic computer skills, including familiarity with the Internet

Student Goals:

Develop skills in logic and strategy

Curriculum Connection:

All

National Educational Technology Standards Connection:

4: Critical Thinking, Problem-Solving, and Decision-Making

Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

5: Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

Imagine This!

Students gaze at a jumble of squares, triangles, and other shapes that are projected onto an interactive whiteboard. "Rotate the small triangle 180 degrees to the left," says one boy. "Wait," he says, "I think it needs to rotate to the right." The students are trying to manipulate the virtual shapes to form a rabbit. With the help of technology, they are mastering geometry and understanding spatial relationships.

What You Need

❒ A computer connected to a whiteboard. Internet access will provide additional educational programs that can be used with the whiteboard setup.

❒ If your program or school does not have a whiteboard setup, you can purchase one of the following:

- ACTIVboard by Promethean (www.mypromethean.com/uk/)
- SMARTBoard by Smart Tech Inc. (http://smarttech.com)

Promethean and Smart Tech Inc. also provide access to materials and resources that you can use in your classroom.

Getting Ready

- Consult with the day-school teacher to plan activities appropriate to your students' needs.
- Check resources that might be available at your school either in the library or with a day-school teacher.
- Read Guidelines for Choosing Appropriate Games, Puzzles, and Tutorials on page 207.
- Select online logic and problem-solving challenges from one of these resources:
  - http://pbskids.org/cyberchase/games/area/tangram.html
  - www.surfnetkids.com/games/Puzzles
  - www.surfnetkids.com/games/clickomania.htm
- Test and practice with the whiteboard equipment. Plan a simple first activity so that you and your students can become proficient with the equipment.

Session 1: Introducing and Playing Games

What You Need

❒ Computer with Internet access, projector, and whiteboard

What to Do

- Demonstrate the rules of the challenge activity.
- Demonstrate how to use the interactive whiteboard for the activity.
- Require students to work toward a level of proficiency. That is, set some goals for mastery.

Extend

- Continue the activity based on student interest and skill level.
- Explore other online logic games.
- See the lesson, "Visualizing Math With Virtual Manipulatives," on page 168 for additional ideas.

Vocabulary

Tangrams originate from ancient Chinese puzzles that consist of seven pieces. The objective of the puzzle is to create a shape using all seven pieces without any pieces overlapping.

Reflection

The questions below are prompts to help you record your ideas, but you can also write additional observations about the lesson that the questions do not cover.

Preparation

- How well did the lesson planning help you prepare for this activity?
- What can you do to feel more prepared?

Student Engagement

- How did you assess student engagement?
- What did you notice about student engagement during the different parts of the lesson?
- How satisfied were you with the level of student engagement? How could you increase student involvement?

Academic Enrichment

- How did this lesson support other academic content areas?
- What changes could you make to strengthen academic enrichment while still keeping the activity fun?

Classroom Management

- What strategies did you use to make the lesson go smoothly?
- What changes would you make if you taught the lesson again?

A Pre-Project Planning Inventory

The following rubric may be used for making decisions when developing or considering a technology-enriched activity. Consider the level of both the students and the instructor in respect to the following:

- **Purpose/Learning Experience:** Learning that will take place as well as curriculum content
- **Skills:** Technology skills necessary to participate in the activity
- **Preparation Needed:** Requirement to plan the activity
- **Time Required:** Time required to carry out and complete the activity
- **Scope:** Others that might be involved in the activity
- **Management:** Managing technology and the students for all aspects of the project

	NEW Technology User	MID-LEVEL Technology User	ADVANCED Technology User
Purpose/Learning Experience	Basic utility, creation, or information gathering	More collaborative product development, exchange of ideas	Information gathering, analysis, synthesis, exchange of ideas, and product development
Skills	Requires the use of one function or application at a time such as using a Web site	Use of more than one function or application at a time such as using a Web site, e-mail, and a word processing program	Multiple uses of functions or applications such as using a Web site, e-mail, or a word processing program
Preparation Needed	Minimal	Requires more advanced preparation	Requires careful and advanced preparation
Time Required	As little as one class period or up to a week	1 or more weeks	Up to a month or longer
Scope	Work contained within classroom	Sharing with one other classroom or expert	Possibly participating with a number of schools or experts
Management	Monitoring individual or small-group work. Coordinating access to computers.	Coordinating access to computers. Facilitating groups. Monitoring communication with other schools, experts. Assisting students with composing e-mail or posts to a message board. Assisting students with creating final product.	Coordinating access to computers. Facilitating groups. Monitoring communication with other schools, experts. Meeting project deadlines. Assisting students with composing e-mail or posts to a message board. Helping students gather data. Assisting students with final product.

LEGO Project Ideas and Resources

Carnegie Mellon Curriculum

Robotics Educator by Carnegie Mellon Robotics Academy

This multimedia CD is a good place for instructors to find instructional ideas for the RoboLab activities. It includes a complete robotics curriculum with lesson plans for activities that last 1, 3, 6, and 9 weeks and are aligned with standards developed by the American Association for the Advancement of Science, the National Council of Instructors of Mathematics, and the International Technology Education Association. It also includes student worksheets and video examples. Math lessons cover such topics as measurement; conversion of units; ratios and proportions; rotational torque; and speed and distance. The cost of this resource (approximately $50) is worth the investment. To watch a demo and preview the curriculum, go to www.rec.ri.cmu.edu/education/roboticscurriculum/index.html.

Tufts Center for Engineering Education and Outreach

This site (www.legoengineering.com) is a virtual encyclopedia of LEGO part names and uses; building and programming hints; and physics concepts. Also, about 40 classroom activities and curriculum ideas using LEGO and Robolab to help teach subjects from science and engineering to reading and art are available for download.

FIRST

For Inspiration and Recognition of Science and Technology (FIRST) is a multinational nonprofit organization that aspires to transform culture by making science, math, engineering, and technology as cool for kids as sports (www.usfirst.org/about/).

FIRST was founded in 1989 by Dean Kamen, inventor of the Segway Human Transporter. The organization operates the FIRST Robotics Competition in which teams of high school students, sponsored and assisted by local companies and volunteers, design, assemble, and test a robot capable of performing a specified task in competition with other teams. FIRST also runs the FIRST LEGO League for children 9–14 years old and FIRST Place, an innovative science and technology center that includes a hands-on children's science museum.

Guidelines for Choosing Appropriate Games, Puzzles, and Tutorials

When selecting any computer-based application, here are some things to consider:

- **Content:** Choose an application that is appropriate and aligns to student needs, curriculum, and instructional goals. Is there a content-area focus such as math, science, or reading? What kinds of benefits will it provide for the students? How many levels of difficulty are offered?
- **Age-range suitability:** Check the age ratings. What age group is it best suited for? Is it challenging enough to cover several grades? Is it designed for group or individual use?
- **Equity:** Is the application gender-neutral? That is, is it appropriate for both girls and boys?
- **Appropriateness:** Does it contain ratings or warnings regarding language, violence, or inappropriate content?
- **Format:** Are the navigation controls, fonts, sounds, screen colors, and images suitable for students across a wide range of abilities and needs? Is the format user-friendly, or will it take a lot of time for students to learn?
- **What others say about it:** Read reviews whenever possible; they can be very informative and can give you an idea as to whether students will be engaged by the software. If students enjoy the activity, the learning part will come more easily. Ask your students and colleagues for suggestions. Have students review various applications and post their reviews for others to see.
- **Technical requirements:** Verify that your computers' operating systems are compatible with the application that you want to purchase and use. Be sure to find out if Internet access is a requirement.
- **Costs and licensing:** Some applications may be free. Others may require you to purchase the software or pay a subscription fee for Internet access. Determine what your budget allows. The cost of purchasing software will vary depending on how many copies you need. Read the fine print regarding contractual and financial agreements. A "lab license" is usually the best way to go if you want several students to have access at the same time. Ask for a demonstration or a trial period.
- **Publishing date and publisher:** This is helpful to know if you want background information or technical support.

Acknowledgments

This resource was developed with the support of the U.S. Department of Education as part of the National Partnership for Quality Afterschool Learning project. It was designed to support 21st Century Community Learning Center instructors who wish to create quality learner-centered environments for their afterschool programs.

The content of the Afterschool Training Toolkit is based on more than 4 years of research and observations at 53 afterschool programs with evaluation data suggesting an impact on student learning. The content also draws from a review of relevant research studies and the experience and wisdom that each of the developers brought to the project. The collective experience of the developers includes afterschool programming, professional development, educational research, program development, program management, and direct instructional experience with students.

The developers believe that these practices and materials will help afterschool leaders and educators create high-quality programs that will motivate, engage, and inspire students' learning and participation.

We extend our appreciation to our site schools and thank the parents of the children in these classrooms for allowing us to showcase their children at work in the toolkit videos.

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U.S. DEPARTMENT OF EDUCATION

Technical Assistance and Professional Development for
21st Century Community Learning Centers

This guide to the Afterschool Training Toolkit was created with the support of the U.S. Department of Education for the use of 21st Century Community Learning Centers. Used with the online Afterschool Training Toolkit, this guide will give you the resources you need to build fun, innovative, and academically enriching activities that not only engage students but also extend their knowledge in new ways and increase academic achievement.

NATIONAL PARTNERSHIP FOR
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Advancing Research, Improving Education