

# *A Sense for Technology: Teacher's Guide*

**Grade Level:** 6-8

**Curriculum Focus:** Human Body

**Lesson Duration:** Two class periods

## **Program Description**

*Super Sonar*—Focuses on bats' ability to navigate using sonar. *Sound or Silence: Cochlear Implants*—Explains the science behind cochlear implants and introduces patients who undergo implant surgery. *Seeing the Light*—Analyzes the structure of the eye to explore how light is seen. *The "Eye" in Inspired*—Meet Shana, a finalist in the Discovery Young Scientist Challenge, who researched genetic eye conditions because her mother is blind.

- I. Super Sonar (5 min.)
  - II. Sound or Silence: Cochlear Implants (32 min.)
  - III. Seeing the Light (3 min.)
  - IV. The "Eye" in Inspired (7 min.)
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## **Onscreen Questions**

Segments I & II

- How are bats helping us learn to "see" with sound?
- How has technology helped people who are deaf?

Segments III and IV

- How do we see light?
  - What are some ways in which scientists are using genetics to understand blindness?
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## **Lesson Plan**

### *Student Objectives*

- Review American Sign Language (ASL).
- Review the fingerspelling alphabet.
- Learn signs for 10 different words.

## Materials

- *A Sense for Technology* video and VCR, or DVD and DVD player
- Computer with Internet access
- Print and online resources about ASL
- Copies of the ASL fingerspelling alphabet

## Procedures

1. After watching the video, ask students what is the main way that deaf people communicate. (They use sign language.) Share these facts about American Sign Language:
  - Deaf people in the United States and Canada use American Sign Language, or ASL.
  - People speaking in ASL use their hands to form signs; ASL also uses facial expressions and body movements.
  - ASL is the native language of most deaf people in America, as English is that of most hearing Americans.
  - Anyone can learn ASL, just as they can learn French, Spanish, or German.
  - Deaf people in many countries use signs; different countries use different sign languages.
  - ASL is the third most common language used in the United States after English and Spanish
2. Explain that students will learn about two forms of ASL: fingerspelling and signing. With fingerspelling, each letter of the alphabet has a special sign which is used to spell the word you want to communicate. With sign language, you use a hand gesture as well as facial expressions and other movements to express an entire word or phrase. Students will learn the basic alphabet (fingerspelling) and a few simple signs. Explain that it would take years of practice to become fluent in this language.
3. Explain that the first step of the lesson involves working in pairs to learn the ASL fingerspelling alphabet. (You may also want students to learn how to sign numbers 1 through 10.) Before students begin, share the following simple rules:
  - Fingerspell with the hand you write with.
  - Don't move your arm when you spell.
  - Pause briefly between words.
  - You don't have to spell quickly, just clearly
4. Have students select a partner, and then give each pair a copy of the ASL alphabet from the first Web site below. (Note that letters "J" and "Z" entail movement. Either review these two letters as a class, or have the pairs visit the site and observe how each is signed.) Give students the rest of the class period and their homework time to familiarize themselves with the ASL alphabet. Their assignment for the next class is to spell "hello," their first name, their partner's first name,

and their favorite food. (Students should not reveal the food to their partner.) If students also reviewed numbers, have them learn their phone number. If students are unsure about what a word would look like, have them use the "ASL Fingerspelling Converter" site below:

- ASL fingerspelling alphabet  
<http://where.com/scott.net/asl/abc.html>
  - ASL fingerspelling converter (see words fingerspelled)  
<http://www.where.com/scott.net/asl/lookup.html>
  - Facts and tips about fingerspelling  
<http://www.signingonline.com/demo/fingerspelling/index.html>
  - ASL signs for the numbers 1-10  
[http://www.masterstech-home.com/The\\_Library/ASL\\_Dictionary\\_Project/ASL\\_Tables/Numbers.html](http://www.masterstech-home.com/The_Library/ASL_Dictionary_Project/ASL_Tables/Numbers.html)
  - Rules for signing numbers  
<http://www.signingonline.com/demo/numbers/index.html>
5. At the beginning of the next class, have the pairs practice what they learned. When students fingerspell their favorite food, can their partners understand them? Have them take turns asking and answering short questions.
6. Explain that in the second part of the lesson, they will learn a few ASL word signs. With this method, people use one sign for an entire word, rather than spelling it out. Have students choose new partners, and assign each pair a topic. You can use the topics below or create your own:
- Around the house
  - Human body
  - Mealtime
  - Family
  - At the store
  - At school
  - Around town
  - Weather
  - Nighttime
  - Music
7. For their assigned topic, have each pair list 10 common words, being sure to include at least two verbs and two adjectives. (For example, the "mealtime" pair may want to learn food, hungry, eat, cook, delicious, hot, pizza, cheese, pepperoni, and mushrooms.) Suggest that students use the Web site below to learn the signs for those words. If the sign isn't provided, ask students to find a new or related word. Have partners practice their signs.
- <http://commtechlab.msu.edu/sites/aslweb/browser.htm>

8. Finally, ask each pair to come up with a short skit, poem, or song that incorporates their 10 signs. Students should perform their pieces for the class, with partners taking turns speaking the words and signing

## Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students actively engaged in class discussions; demonstrated how to fingerspell most of the letters of the alphabet; successfully fingerspelled all the assigned words; researched and demonstrated 10 ASL signs; and presented a clear, coherent performance using all 10 ASL signs.
- **2 points:** Students showed satisfactory participation in class discussions; demonstrated how to fingerspell some of the letters of the alphabet; fingerspelled most of the assigned words; researched and demonstrated most of the ASL signs; and presented an adequate performance using most of the ASL signs.
- **1 point:** Students participated minimally in class discussions; fingerspelled few or none of the letters of the alphabet; did not satisfactorily fingerspell the assigned words, research and demonstrate the ASL signs, or present an adequate performance using ASL sign.

## Vocabulary

### American Sign Language (ASL)

*Definition:* The system of sign language used in the United States and Canada

*Context:* Facial expressions and body movements are important components of ASL.

### fingerspelling

*Definition:* To use your hands to sign the letters of a word (also called the "manual alphabet")

*Context:* Fingerspelling is often used for names and for obscure or unknown words.

### sign language

*Definition:* A form of communication based on hand gestures ("signs" formed by the hands), body movements, and facial expressions, rather than the spoken word

*Context:* Over one million people in the United States communicate using sign language.

## Academic Standards

### National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science
- Science in Personal and Social Perspectives



### Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit link:

<http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Language Arts – Viewing: Uses viewing skills and strategies to understand and interpret visual media; Writing: Uses the general skills and strategies of the writing process
  - Foreign Language – Understands that different languages use different patterns to communicate and applies this knowledge to the target and native languages
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### Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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### DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

#### *How To Use the DVD*

The DVD starting screen has the following options:

**Play Video** – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

**Video Index** – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

**Curriculum Units** – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.



**Standards Link**—Selecting this option displays a single screen that lists the national academic standards the video addresses.

**Teacher Resources**—This screen gives the technical support number and Web site address.

## **Video Index**

### **I. Super Sonar (5 min.)**

The United States Navy uses the ability of bats, who “see” with sound, to implement sonar and find dangerous mines hidden in the ocean.

### **II. Sound or Silence: Cochlear Implants (32 min.)**

Thanks to the cochlear implant, science has found a way for some deaf people to hear. Follow the journey of two people as they discover the sounds of the world.

### **III. Seeing the Light (3 min.)**

Vision is a complex sense that relies on a finely tuned interaction between the brain and the inner workings of the eye.

### **IV. The “Eye” in Inspired (7 min.)**

Shana Matthews is a high school student and Discovery Young Scientist Challenge finalist whose mother’s impaired eyesight gave her a reason to research genetic diseases.

## **Curriculum Units**

### **1. Bats and Sonar**

*Pre-viewing question*

Q: Do you think it is as easy to use sonar as it is to use your eyes?

A: Answers will vary.

*Post-viewing question*

Q: What is sonar?

A: Sonar, or sound navigation and ranging, is a system that uses reflecting sound waves to depict images.

### **2. Machine Sonar**

*Pre-viewing question*

Q: What might be some differences between machine sonar and natural sonar?

A: Answers will vary.

*Post-viewing question*

Q: How does side-scan sonar work?

A: Side-scan sonar sends sound waves to the ocean floor. When they hit an object, the sound waves return an echo. Coming from the side, the sound energy casts a shadow behind the object and shows its shape.



### 3. Choosing the Cochlear Implant

*Pre-viewing question*

Q: Why might a deaf person choose not to have a cochlear implant?

A: Answers will vary.

*Post-viewing question*

Q: What is the difference between hearing aids and the cochlear implant?

A: Hearing aids amplify sounds while the cochlear implant is a computerized substitute for the entire human hearing mechanism.

### 4. How the Implant Works

*Pre-viewing question*

Q: Can computers accurately mimic human functions?

A: Answers will vary.

*Post-viewing question*

Q: How does the cochlear implant work?

A: An external microphone picks up sounds and sends them to a tiny computer, which translates them to digital information. The information travels by wire to a transmitter that goes to a receiver, which is mounted on the skull. A computer chip distributes the sounds to electrodes in the cochlea. The electrodes deliver a spectrum of impulses directly to the sound nerves, which transmit them directly to the sound-processing center of the brain.

### 5. The Deaf Community and the Cochlear Implant

*Pre-viewing question*

Q: Who should make the decision to choose a cochlear implant: a deaf child or parents?

A: Answers will vary.

*Post-viewing question*

Q: Do you think the cochlear implant will cause the deaf culture to vanish?

A: Answers will vary.

### 6. The Implant and Children

*Pre-viewing question*

Q: What are the benefits and drawbacks of receiving a cochlear implant as a child?

A: Answers will vary.

*Post-viewing question*

Q: Why is age a major factor in maximizing the benefits of a cochlear implant?

A: Neurobiologists think that maximum benefits are achieved for children no older than two or three years of age, when they are learning language. The implant's effectiveness decreases with age; the earlier a child receives the implant, the greater its effectiveness.

### 7. Susan and Cecilia: Adult vs. Child Implants

*Pre-viewing question*

Q: Would you get a cochlear implant if you were deaf?



A: Answers will vary.

*Post-viewing question*

Q: What do you think it feels like to hear for the first time?

A: Answers will vary.

## 8. A Day to Remember

*Pre-viewing question*

Q: What do you think would be the most difficult aspect of adapting to the hearing world for a deaf person?

A: Answers will vary.

*Post-viewing question*

Q: What sounds would you miss the most if you were to become deaf?

A: Answers will vary.

## 9. The Cornea and Iris

*Pre-viewing question*

Q: What do you think it feels like to be blind?

A: Answers will vary.

*Post-viewing question*

Q: What does the iris do?

A: The iris is a muscle that gives the eye its color. It also contracts in dim light and expands with more light to adjust the amount of light entering the eye.

## 10. The Retina

*Pre-viewing question*

Q: Do you have blind spots in your vision?

A: Everyone has a blind spot in each eye. But by working together, the eyes compensate for these blind spots.

*Post-viewing question*

Q: Why is it hard to see colors in the dark?

A: Cones – the parts of the retina that detect color – work best in bright light.

## 11 Meet a Young Scientist

*Pre-viewing question*

Q: How do personal interests influence your academic interests?

A: Answers will vary.

*Post-viewing question*

Q: What contributions would you like to make to the world?

A: Answers will vary.



## 12. Shana's Project

*Pre-viewing question*

Q: What would you do to help a parent overcome a debilitating disease?

A: Answers will vary.

*Post-viewing question*

Q: What could advances in genetic medicine do for you or your family?

A: Answers will vary.

