

SUGGESTED REFERENCES

- *MIT News: MIT Touch Lab research spans basic science, virtual reality*
<http://web.mit.edu/newsoffice/nr/1999/touchlab.html>
- *Southwest Educational Development Laboratory*
<http://www.sedl.org/scimath/pasopartners/senses/lesson4.html>
- *Human Interface Technology Lab: Tactile Augmentation*
<http://www.hitl.washington.edu/>
- *Minutes From Me: Touching*
<http://sln.fi.edu/qa97/me10/me10.html>
- *Discovery School: Offers lesson plans and information on topic*
<http://school.discovery.com/lessonplans/programs/humanbody>
- *Research Matters: First Domino Falls in Research on Sense of Touch*
http://www.researchmatters.harvard.edu/story.php?article_id=171

NATIONAL SCIENCE EDUCATION STANDARDS

K - 12

Science and Technology

Understanding about science and technology

5 - 8

Life Science

Diversity and adaptations of organisms

*Source: *National Science Education Standards, 1996, National Academy Press*

CREDITS

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SCIENCE SCREEN REPORT

VOLUME 34 ISSUE 1

FORGOTTEN SENSE OF TOUCH



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SYNOPSIS

At some point in our lives we might meet a person who has lost one of their senses. Most often it will be one who has lost sight or hearing. Science and technology have been able to assist people with their loss of sight or hearing through corrective surgery or the use of an aid. But what is available for those who lose their sense of touch?

Each day our sense of touch is put to the test. Whether it is testing water for a bath, holding a coffee mug, caressing a loved one, or greeting someone with a handshake, we rely on touch. In this edition of SCIENCE SCREEN REPORT, we will explore the latest technologies available for those who have lost their sense of touch.

CURRICULUM UNITS

- ANATOMY
- BIOLOGY
- HEALTH
- PHYSICAL SCIENCE
- PHYSIOLOGY

RUNNING TIME

14:45

BACKGROUND

Whether it is a handshake, or petting man's best friend, our sense of touch is responsible for feeling the world around us. Throughout our lives we may encounter people who have lost the use of one of their senses. We may question what life would be like without the use of one or more of our senses.

The skin is the largest and most sensitive organ. With thousands of touch receptors, it allows us to be in contact with our surroundings as it protects our body. The touch receptors send electrical impulses along nerve fibers to the brain where the information is processed and analyzed. The brain then signals the particular region of our body affected by touch.

Touch is our first form of communication. Studies have shown that as early as eight weeks an embryo has a developed sense of touch. Once a child is born, it is this sense that brings comfort and trust to the new relationship between parent and child.

During the 20th century, it was believed that touch was harmful for a baby. Parents were advised not to embrace a baby if it cried, nor to interact with babies younger than six months. Hospitals experienced high rates of infant mortality. In 1938, hospitals set out on a mission to reduce the rate of infant deaths. During this time, a new technique that stimulated infants through touch, called "mothering," was introduced. This decreased the infant mortality rate.

Our hands are the most sensitive and used parts of the body. Everyday wear and tear can cause the hand to become rough and lose sensitivity to touch. Our feet are almost as sensitive as our hands. Walking barefoot thickens the skin covering the sensors in the foot and causes a decrease in sensitivity.

Within the body are sensors that allow us to feel pain, temperature and pressure. Sensors that detect cold are located primarily in the face and trunk, and protect our vital organs from becoming too cold. Heat sensors are found mostly on the tongue, preventing us from swallowing foods that are too hot. The ability to feel textures like smoothness, roughness and softness come from the pressure of touch. Without this ability, we wouldn't be able to judge the amount of pressure needed to grab and hold onto items.

Animals are also affected by touch. For example, a dog wagging its tail tells you that it enjoys being touched. Touch can have a calming effect on a dog's heart rate. In return, dogs can have similar effects on humans. People who have high blood pressure can reduce it by simply spending quality time with a dog.

When one loses a sense, the other senses become stronger. Researchers all over the world are working to develop interfaces that may someday allow people who have lost their sight to see again. This time, they will "see" through touch. Scientists are slowly advancing this concept by processing visual information through the skin.

The sense of touch is a very powerful stimulation. Not only does it allow us to stay in "touch" with our surroundings, but it enables us to complete everyday tasks and enjoy what life has to offer. Scientists are continuing to conquer the complexities of the sense of touch. Little by little they are piecing together information that will one day help those with an impaired sense of touch.

ADVANCED ORGANIZERS

Prior to viewing this video, students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 3: The Nature of Technology

Section A - Technology and Science

Know by Grade 5

- Technology extends the ability of people to change the world: to cut, shape, or put together materials; to move things from one place to another; and to reach farther with their hands, voices, senses, and minds. The changes may be for survival needs such as food, shelter, and defense, for communication and transportation, or to gain knowledge and express ideas.

Section C - Issues in Technology

Know by Grade 5

- Because of their ability to invent tools and processes, people have an enormous effect on the lives of other living things.

Benchmark 6: The Human Organism

Section C - Basic Functions

Know by Grade 8

- Interactions among the senses, nerves, and the brain make possible the learning that enables human beings to cope with changes in their environment.

Benchmark 8: The Designed World

Section F - Health Technologies

Know by Grade 5

- Technology has made it possible to repair and sometimes replace somebody parts.

**Benchmarks can be found at www.project2061.org/tools/benchol/bolintro.htm*

CRITICAL THINKING EXERCISES

- Visit the following website to view a diagram of the epidermis (the skin) and play interactive games. Have students identify parts and then label a diagram of the epidermis.
<http://faculty.washington.edu/chudler/receptor.html>
- Writing: Where Am I? Create "A Touching Story". Be sure to review adjectives that describe textures, temperature etc. The story should be very descriptive so that the reader can identify what is being described.
- Invite guests who are vision impaired. Guests can be a student in the class or staff at the school. Discuss whether their other senses are enhanced by their loss of vision, and which sense they rely upon most. How does this effect everyday life for them?
- Students can blindfold one another and discuss how their loss of vision has increased their need for the sense of touch.
- Research Louis Braille and how his invention has improved communication for people who have lost their vision. Identify how the sense of touch is important in Braille.
- Research the American Disabilities Act (ADA). Does this act protect those who have lost their sense of touch? If not, should it? A class debate can be held to voice opinions on this topic.
- Create a maze for students to "feel" their way through. Discuss the role our sense of touch plays in successfully completing the maze. Journal the challenges experienced.

VOCABULARY

Electrodes

Embryo

Hypertension

Interfaces

Massage

Mortality

Nerve Fibers

Olfactory

Organs

Primary sensory cortex

Receptors

Tadoma Method

CAREER POSSIBILITIES

- OCCUPATIONAL THERAPIST
- ORTHOPEDIC DOCTOR/SURGEON
- ORTHOPEDIC THERAPIST
- PHYSICAL THERAPIST