The Innovation Station exhibit

Educational Objectives
The primary focus of the exhibit is to promote technological literacy. By engaging your students in pleasurable, empowering, social experiences, the exhibition will improve students’ understanding of technology, increase their competency with technology, and influence their attitudes and emotions toward technology in a positive way.

Many of the exhibits include activities centered on the design process. Design exhibits allow visitors to actively engage in the process of technology, while supporting the concept that anyone can be involved.

We also focus on human stories—how people use technology to change their world. The exhibits stimulate interest by presenting technology in a context that is meaningful to all our visitors.

The exhibits support emerging standards for technology education published by the International Technology Education Association. Technology themes explored in Innovation Station include:

- The Nature of Technology (standards 1, 2)
- Technology and Society (standards 4, 5, 6)
- Design (standards 8, 9, 10)
- Abilities for a Technological World (standards 11, 13)

More educational content is available at www.omsi.edu/tech. Online resources include classroom lesson plans, interactive games, a glossary, and a bibliography of educational resources.

There are four big ideas that the entire exhibit centers on:
- Technology is more than computers and electronics.
- Everyone is affected by technology.
- We all have the ability to affect technology.
- All technologies have benefits and drawbacks.

Technology is more than computers and electronics.
Technology can be any tool that people use: from the first stone tools, to a toothbrush, to a nuclear power plant. Many people think of computers and consumer electronics as “technology”, but really any tool or technique people use can be considered technology.

- Ask your students what tools they use at home or in school. Which ones make their work easier? Are there any that frustrate them? What could they do to improve those technologies?
Innovation Station Teachers Guide

Everyone is affected by technology.

Technology is so deeply woven into the fabric of modern life that it has become all but invisible. Innovation Station tries to highlight how technology has impacted people’s lives. Encourage students to consider the technologies they use everyday.

- Imagine a city like Portland, and remove all the technology – electricity, plumbing, transportation, etc. What is left? Which technologies are the most important to modern life?
- Imagine you were shipwrecked on a desert island. What technologies would you want to have with you? Which wouldn’t help you at all?

We all have the ability to affect technology.

Although we can feel overwhelmed by the pace of changing technology, we all have a part in directing it. We all make choices - as individuals and as a society - about the technologies we use. Some technologies have sparked public debate, like stem cell research or fingerprint scanners. But when we purchase new technologies, vote, or even make everyday decisions we either encourage or discourage the use of different technologies.

- Ask students what technologies make them feel concerned or uneasy. What technologies do they feel are really important?
- Technology makes new, once impossible things, possible. But we decide whether we want to do these “impossible” things. For example, if you could download your brain onto a computer and live forever would you do it? Why or why not?

All technologies have benefits and drawbacks.

All technologies, not just obviously risky ones, have both benefits and drawbacks. Most technologies are more advantageous for some purposes than others. Many consequences of technologies are difficult for us to anticipate or predict.

- What are some things you consider when making decisions: cost, quality, comfort, convenience, the environment? Think about your choices: paper or plastic, car or bus or bicycle? What factors are most important to you when you make daily choices?
- Think about a technology that has emerged recently, like cell phones. How has the increased use of cell phones changed our world? People drive while talking, there are towers everywhere, you don’t need a “land line”, and can be reached anywhere. Have cell phones changed our world for the better?

Exhibition Overview

The exhibits in Innovation Station cover several topics: Invention; Computers; Water; Robotics; Technology Choices.
**Invention**
Become the inventor in this series of highly interactive, hands-on activities that allow you to engage in the process of technology. These exhibits encourage collaboration, creative play, and experimentation, while promoting the notion that anyone can be involved with technology.

**Inventors Ball-Room**
Use your creativity and problem-solving skills to engineer systems for delivering balls to different goals throughout this fun-filled, kinetic environment. By building and inventing with a hodge-podge of pieces, visitors create, utilize, and control their very own technological systems in a unique, full-body, interactive space.

**Float table**
Where do great ideas come from? You’ll get a chance to find out, as you design a creation that can float, hover, spin, and fly above the “float table”. Explore how inspiration often comes from nature or improve on other people’s designs to make your own ideas soar.

**Back to the drawing board**
At a large drafting table, you become the designer. Using tools of the trade—measuring and drawing implements, grids, and templates—respond to one of several design challenges or craft your own creation in this open-ended, role-playing activity.

**Oregon Inventors**
We describe the work of four inventors from Oregon with a series of artifacts and copy panels. The exhibit provides concrete examples of “normal” people who used their imagination, training, and creative talents to invent a new product, process, or system.

**Computers**
These exhibits explore our relationship with an icon of modern technology—the computer. The exhibits are not intended to provide a definitive explanation of how computers work. Rather, they are aimed at increasing our comfort-level, understanding, and awareness with the ever-increasing number of computer-based technologies in our environment.

**Build a Computer**
Does your PC need more RAM? What does CPU stand for? The computer world is full of jargon, acronyms, and mysterious technology. This hands-on exhibit gives you a chance to “build” an oversized desktop computer while learning about many of the components typically found inside. You’ll find out what the components do, why they are needed, and how they work, helping you understand what goes on inside the box.
**Electronic Waste**
This display of computer junk prompts you to think about the environmental challenges associated with the disposal of electronic waste. Find out what you can do with your old equipment to minimize environmental impact.

**Hidden Computers**
Take a peek through a simulated x-ray scanner and discover the computers embedded in many everyday objects. The exhibit invites users to guess where computers might be hiding and reflect on how computer technologies affect our lives on a daily basis.

**Water**
The Water exhibits provide an opportunity for students to think about a familiar topic in an unfamiliar way. Water is essential to life—we use it for drinking, sanitation, farming, industry, and to generate power—yet many of us are unfamiliar with the enabling technologies employed in these tasks. The individual exhibits in this area explore various aspects of technology associated with the use of water by humans through history and around the globe.

**Water Works**
Be the engineer as you design and build a system to move water from the source to the community. Can your aqueduct provide enough water to turn a waterwheel or power a pump? This hands-on exhibit immerses you in engineering design—a problem-solving process that is purposeful, systematic, iterative, creative, and has many possible solutions. Copy panels provide context, showing how water technologies changed society by allowing populations to grow and establish urban centers far from traditional sources of water.

**Water Display**
This 3-D collage of images and artifacts explores a range of technologies—from simple to sophisticated—that people use to move, clean, collect, and store water. The exhibit illustrates how people around the globe respond to different challenges by utilizing the resources on hand and thinking outside the box.

**Water, Technology, and Choices**
Graphic panels illustrate a technology trade-off using a local example. Dams on the Columbia River generate electricity to power our cities, but have disrupted the traditional way of life for many Native Americans. Dams also impact the natural environment, but the consequences are still in dispute. This exhibit is designed to foster critical thinking and inspire discussion about the costs and benefits of technology.

**Robotics**
Do robot arms move in the same way as human arms? Can you successfully program a robot? What are some of the strengths and weaknesses of robots? The popular theme of
Innovation Station Teachers Guide

robotics is used to engage students in hands-on activities and encourage critical thinking about technology.

Program a Robot
Can you program a robot to collect rock samples on Mars? Put your creativity and problem-solving skills to the test as you engage in a technological process—writing a program for our on-screen rover. Accompanying text and graphic panels explore the roles that robots and people will play in the workforce of the future.

Big Robot Arms
Two large robot arms perform a suite of activities that change throughout the day. The exhibit includes an interactive robot-hosted show where you can discover the similarities and differences between robots and humans. Other activities involve numerous “loop and wire” challenges, allowing you to compare your speed and dexterity to the robots’.

Technology Choices
An important aspect of technological literacy is the ability to assess the impacts and trade-offs associated with buying, using, or employing any given technology. At an individual level, this awareness helps consumers better assess products and make more intelligent buying decisions. At a societal level, technologically literate citizens have the potential to inform public policy decisions involving technology. These exhibits give you the opportunity to have fun while examining your own and other OMSI visitors’ attitudes towards technology.

Technology Teasers
Do you trust everything you read on the Internet? Would you accept a donor organ from a pig? Record your own answers and find out what other OMSI visitors think as you respond to a series of tricky technology questions. This on-screen game prompts students to reflect on technology trade-offs and think critically about our technological world. Along the way you’ll find out how your opinions fit with those of other OMSI visitors, and you might learn some surprising facts about technology. Additional copy panels discuss the technology choices we face every day.

Visitor postbox
What do you think about technology? Here’s a chance to have your say and be part of an ongoing conversation about technology. Write a thoughtful response to the technology question of the day, and your answer could be posted for other visitors to view.

Technology in your life
We asked eight Portland residents “What’s the most important technology in your life?” See how they responded in this exhibit featuring fun photos and personal reflections. Which technology would you choose?
Innovation Station  Teachers Guide

Vernier Technology Lab
The Vernier Technology Lab is next to the Innovation Station exhibit, and was developed with the same ideas in mind. The activities are grouped into units that focus on particular topics in technology. The units rotate every few weeks. (The calendar of unit rotation is at http://www.omsi.edu/visit/tech/calendar.cfm.)

Security Technology
Technology we use to keep ourselves safe, but usually makes us give something up.

Secret Code Machine
Read a secret message, and then write one to your friends, using our decoder ring!

Open and Shut
Figure out how to open our giant locks, both with keys and combinations. Different locks have different strengths and weaknesses.

Metal Detector
Detect metal and see inside a metal detector. Find out what a metal detector can find, and what it can’t.

Childproof/Adultproof
Open our super childproof cabinet. Experiment with several “childproof” medicine bottles.

Surveillance Cameras
Watch people in the museum. How many cameras see you every day?

Fingerprinting
Make art with your fingers! Record your fingerprints, and compare them with other people.

Computers and Robots
Technology we program to copy human behavior.

Chatbots
Chat with computer programs, new and old. Can they fool you into thinking you’re chatting with a person?

Robot Doll
Compare our robot doll with real babies. Robots are much more predictable, doing only what people program them to do.
**Build a Bug-Bot!**  
Build a model robot inspired by insects. Learn how people copy nature when inventing things.

**Color Code**  
Use colors to program a robot. Can you figure out what each color means to the robot?

**Ancient Computers**  
Use an abacus and a slide rule. People used these for hundreds of years. Are calculators really better?

**Music Bots**  
Make a musical program, then play it back over and over!

**Biomedical Technology**  
Technology we use on living things.

**Genetically Modified Food**  
Try to tell the difference between GMO food and organic food. Learn many opinions about whether it’s safe or not, then decide what you think!

**Sutures**  
Stitch a giant wound shut. Decide which needle to use. Try to use tweezers to tie a knot.

**Are your hands clean?**  
Wash your hands, and see if you really cleaned them. Doctors have to be very clean when taking care of sick people.

**Dental Tools**  
Clean teeth with real dental tools. Find out what each tool is designed for.

**Measure your heart**  
Use an EKG probe to measure the electricity in your heart. See how it changes as your activity changes.

**Doctor Tools**  
Use our play tools to take care of a teddy bear. Learn what tools doctors use, what they’re called, and what they look like.

**Communications Technology**  
Technology we use to share ideas with other people.

**DVD/VCR**  
Compare the quality of different recording technologies. See inside a working VCR!
TV
See inside a TV, and learn how it works! See yourself on the screen, and distort the picture.

Totem Pole
Make your totem, and hang it on our totem pole. Learn how natives of the Pacific Northwest carved their poles.

Alphabets
Write messages in sounds and pictures. See the Rosetta Stone, and learn how different cultures invented different writing systems.

Printing Press
Print a message on our printing press, and learn how the press changed history.

Make a Speaker
Learn about electromagnets when you put together a speaker. Try different materials to see what works best.

Household Technology
Technology we use in our homes, without always realizing it.

Loom
Weave a section of the OMSI tapestry. Learn how fabric is made.

Shelter
Build a model shelter. What materials are best for your needs?

Fasteners
Tie a tie, a shoe, and use other clothing fasteners. What does Velcro look like under the microscope?

Microwaves
See how microwaves work, and learn the facts about microwave safety.

Coffee
Play with a real espresso machine, and learn the history of coffee.

Visible Refrigerator
See inside a refrigerator and learn how it works.