Comparing Technology to the Human Body: Hardware vs. Software

Participant Name:	**Jill Masuk**
District:	**SLL Boces**
Grade Level:	**4-6**
Subject/Course:	**Network and System Design**
Cross-curricular Link:	**Science, ELA**
Approximate Time (IN MINUTES):	**45 minutes**

CONTENT AND SKILLS

Learning Objectives:

- Understand how hardware and software work together in technology to accomplish tasks.
- Compare the human body to technology by relating body parts to hardware and the mind/brain to software.
- Identify how humans and technology both rely on systems to process information and carry out functions.

Essential Questions (optional):

- How do the hardware and software in both the human body and computers work together to process information and accomplish tasks, and how does this relationship impact our daily lives?

Students' "I can" statements . . .

- I can identify and explain the difference between hardware and software in both computers and the human body.
- I can compare the brain to a computer's CPU and describe how they both process information and give instructions.
- I can explain how hardware and software work together to complete tasks and how this relationship impacts technology and daily life.

How will you meet the needs of SWD and ELL/MLL students?

- Offer extra time to complete activities and assignments.
- Assign a peer buddy or offer small-group instruction for students who need more personalized support.
- Allow students to complete the chart on the computer to use voice typing, text readers, magnifiers.
- Provide a bilingual glossary of key terms (hardware, software, CPU, etc.) in students' home languages. (needs to be added to documents based on your class needs)
- Use Google Translate to allow ELL students to voice type in the chart
- Provide **translations** of the essential question and key concepts to help ELL students reflect and engage with the material. (needs to be added based on your class needs)

NYS COMPUTER SCIENCE AND DIGITAL FLUENCY STANDARDS

List all standards that authentically align (e.g., K-1.CT.4)

- 4-6.NSD.2 Describe how hardware and software work together as a system to accomplish tasks. (The handout helps students explore the analogy between human anatomy and technology, emphasizing how the hardware (body or physical components) and software (mind or computer instructions) work together to accomplish tasks.)
- 4-6.IC.3 Explain how computing devices impact daily life, both positively and negatively, in school and society. (Through this lesson, students begin to see the parallels between biological and technological systems and how both can be used to perform tasks in everyday life.)

OTHER SPECIFIC STANDARDS (e.g., Content, SEL Benchmarks)
List all standards that authentically align
https://www.p12.nysed.gov/sss/documents/SELBenchmarks2022.pdf

- **4-LS1-1**: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. (Students compare body systems (eyes, brain, hands) to computer systems. This supports an understanding of how sensory input, brain functions, and movement interact, similar to how computers use input-output devices to function.)
- **4SL1**: Engage effectively in a range of collaborative discussions with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. (Students engage in group discussions, using oral language to share and develop ideas collaboratively.)
- **2B.2b**. Demonstrate ability to communicate across a variety of groups. (group discussion & activity)

INSTRUCTIONAL PLAN
List the steps of the lesson, including instructions for the students.
Add and highlight Standard Indicator next to activity that aligns

Introduction (10 minutes)

Begin with a discussion:
- "Think about a computer or a tablet you've used. What parts can you touch? What makes these parts work?"
- "What about your own body? Can you think of ways your body works like a computer?"

Let students brainstorm and share ideas.

Explain Hardware and Software:

- Hardware: The physical components of a system, such as a computer's monitor, keyboard, or mouse, or your eyes, hands, and legs in the human body.
- Software: The programs and instructions that control how a system operates, like apps or games in a computer, and the brain and nervous system in the human body.

Exploration Activity (20 minutes)

Interactive Demonstration: Comparing Human Body and Technology (4-6.NSD.2)

- Body as Hardware: Show an image of the human body and explain how body parts are like the hardware of a computer. For example, eyes are like a screen, hands are like a keyboard, and the brain is like a CPU.
- Mind as Software: Explain that the brain and nervous system send signals to the body to tell it what to do, just like software sends commands to the hardware in a computer.
- Human Actions: Ask students to raise their hands or walk across the room, explaining that the brain (software) sends instructions to the muscles (hardware) to perform these tasks. Compare this to using a computer, where the software tells the screen to show images or the keyboard to type letters.

Group Activity: Create a Comparison Chart (4-6.IC.3)

- Divide students into small groups.
- Provide each group with a chart and ask them to list comparisons between body parts and technology components, such as:
    - Eyes = Screen (both used to see information)
    - Brain = CPU (both process and control actions)
    - Hands = Mouse/Keyboard (both used to interact and input information)
- Encourage students to think about how the hardware (body parts) can't function without the software (brain or programs).

Discussion (10 minutes)
Share Group Findings:

- Groups present their charts, explaining how they matched body parts to technology components.
- Lead a class discussion on how the human body and technology both rely on systems of hardware and software to function properly. Ask questions like:
    - "How does your brain control your body like a CPU controls a computer?"
    - "What happens when your brain (or a computer's CPU) stops sending commands?"

Assessment:

- **Formative**: Monitor group discussions and check students' understanding as they create their comparison charts.
- **Summative**: Have students complete the handout, where they draw a human body and a computer, labeling the "hardware" and "software" for both systems.

Real-World Connection (5 minutes):
Wrap up the lesson by discussing how engineers and scientists study both the human body and technology to create inventions like prosthetics, AI, or robots. These systems rely on understanding the relationship between hardware (body or machines) and software (the brain or programming).

Extension Activity (Optional):
Students can research how AI (artificial intelligence) and robots are designed to mimic human actions and thought processes, comparing them to their own bodies and minds.

SPECIFIC NEEDS: MATERIALS / RESOURCES / TECHNOLOGY

Add additional resources needed for this lesson such as instructional technology templates, images, videos, etc.

- Projector or screen
- Slide deck for introduction and exploration activity
- Handout for comparison between body parts and technology - Student Copy - Teacher Answer Key
- Student devices (optional) for extension activity or digital handout for students to complete (with or without modifications)