VIDEO GAMES AND MIND CONTROL-TELEKINESIS

Document Overview:

Description of Activity
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Student Handout

Minnesota State Science Standards:

9.1.2.1.3 Explain and give examples of how, in the design of a device, engineers consider how it is to be manufactured, operated, maintained, replaced and disposed of.
9.1.3.1.1 Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs.
9.1.3.3.3 Describe how scientific investigations and engineering processes require multi-disciplinary contributions and efforts.
9.1.3.4.1 Describe how technological problems and advances often create a demand for new scientific knowledge, improved mathematics and new technologies.
9.1.3.4.3 Select and use appropriate numeric, symbolic, pictorial, or graphical representation to communicate scientific ideas, procedures and experimental results.
9.1.3.4.6 Analyze the strengths and limitations of physical, conceptual, mathematical and computer models used by scientists and engineers.

Objectives:

- Students will engage in the lesson by viewing video clips of new technological capabilities which allow people to control electronics with only their minds.
- Students will analyze their favorite video game or electronic device in terms of specific movements/steps needed to play the game/use the device from start to finish.
- Students will create labeled diagrams of the components necessary to play/use their chosen game/electronic device.
- Students will analyze the areas of the brain that are involved when they play/use their game/electronic device.
- Students will analyze what thought processes would be needed to control the movements of their game/device with only their mind.
- Students will conclude by viewing a "60 Minutes" video clip including the work of John P. Donoghue, PhD, a Nobel Conference speaker, and the research and engineering work he has done allowing the mind to control such things as a wheel chair, a computer, and even a prosthetic arm.

Type of Activity: Project

Duration: 2-3; 55 minute class periods, plus homework

Connection to Nobel speakers:

- Speaker: John P. Donoghue, Ph.D. Henry Merritt Wriston Professor, Department of Neuroscience, and Director, Institute for Brain Science, Brown University, Providence, R.I.
    - For more than 20 years John Donoghue has conducted research on brain-computer interfaces, and his laboratory is internationally recognized as a leader in this field. One of the most significant breakthroughs in the field of neural interface systems occurred when Donoghue's group restored the ability of a quadriplegic patient to operate computer cursors and robotic arms by imagining the movement.

Materials:

Thorough knowledge of how to operate a video game (Internet games would work) or electronic device.

Modification-For students that do not play video games, any electronic device would work (ipod, iphone, digital camera, computer, etc.)

Student Handout

Picture(s) of operation of device (May include game controller, screen shot of gameplay, device itself, etc). Pictures may be drawn or printed.

Description of Activity:

In this activity, students have the opportunity to analyze their favorite video game or electronic device "for school purposes"! Most students will love this! Students start by viewing several video clips of new technologies which allow control of electronic devices with the mind. Students then choose a favorite video game (or electronic device) to analyze in terms of what motions are necessary to play the game (or control the device) from start to finish. Students must write step by step instructions for their game/electronic, from turning the device on to successful completion of a specific task. Steps should be so specific that someone who has never used the device may follow the instructions and successfully play the game (use the device). <The teacher may choose to have students try out their instructions on a student that is unfamiliar with their game/device. See extension.> Students must also include pictures or drawings of the necessary equipment and label where/how the steps would occur. Students will analyze a picture of the brain and describe which regions are used when they operate their chosen device. Finally, students will actually play/use their chosen game electronic device while a friend or family member records observations of behaviors/actions and thoughts/feelings expressed by the player (user). Students will analyze the impact that their emotions would have on their ability to control the game/device with their mind. The activity will close with students viewing a 60 minutes

video clip on the work of John P. Donoghue, Nobel Conference speaker, and his work with using the mind to control devices.

Lesson Video Clips:

Note: Teacher may select from the following videos to show prior to the activity. It is recommended that the teacher show the "60 Minutes" clip as a wrap-up to the lesson.

Controlling video games with your mind [BBC News Report]
http://www.youtube.com/watch?v=wNr3yGcI_V8

Control a computer with only your brain [Science Channel]
http://www.youtube.com/watch?v=ZKA2-zvinQc&NR=1

Experiments in Thought Control: Intro-7
http://www.nature.com/nature/focus/brain/experiments/index.html

60 Minutes: Brain Power
http://www.cbsnews.com/video/watch/?id=5228109n

Extensions:

1. The teacher may choose to do a pre-lesson to get the students thinking about how to write specific procedures. A simple, yet effective way to do this is to place materials needed to make a peanut butter and jelly sandwich on the lab table . Ask every student to write their own step by step procedure for how to make the sandwich. Collect the procedures. Call on a volunteer to act out the instructions. Read for the volunteer and the rest of the class one of the procedures. Instruct the volunteer to do exactly what the procedure says and nothing more. They may not "read between the lines". For example, if there is a twist-tie on the bread bag, and the procedure does not state to remove the twist tie, that procedure will not work. If the procedure chosen does not result in a peanut butter sandwich, read the next one for a new volunteer and so on.

2. As part of the project, students may choose to show video footage of their gameplay. Students may also choose to use video footage to demonstrate all necessary movements within the game.

3. Article: Implant could free power of thought for the paralyzed (Unable to move, Matthew Nagle can play Tetris, draw and turn on the TV using the chip in his brain) http://wireheading.com/misc/implant.html

4. John Donoghue videos: These may be helpful as background information.
   RSA Conference part 1 of 5
   http://www.youtube.com/watch?v=AN0GSz5hVHg
   RSA Conference part 2 of 5
   http://www.youtube.com/watch?v=fwHybwTa-KU&feature=related
   RSA Conference part 3 of 5
   http://www.youtube.com/watch?v=EDpnlR0WbWQ&feature=related
   RSA Conference part 4 of 5
   http://www.youtube.com/watch?v=t0DDYW5eGMw&feature=related
   RSA Conference part 5 of 5
   http://www.youtube.com/watch?v=r1nUEJ82nYI&feature=related

Student Handout:

VIDEO GAMES AND MIND CONTROL-TELEKINESIS

1. Describe the name of the game/electronic device:

2. Describe the objective of the game or task. (What is the player/user's goal?)

3. List and number the steps necessary to play the game or complete the task. Steps will begin with how to turn on the game/device, select specific game/task, etc. If you choose

a video game, you must include directions for how to complete every single movement that your "player" is capable of. Organize this in a way that makes sense. Don't be surprised if you have over 20 steps.

4. Draw or print and label as many diagrams as are necessary to visually show the steps listed in the previous step.

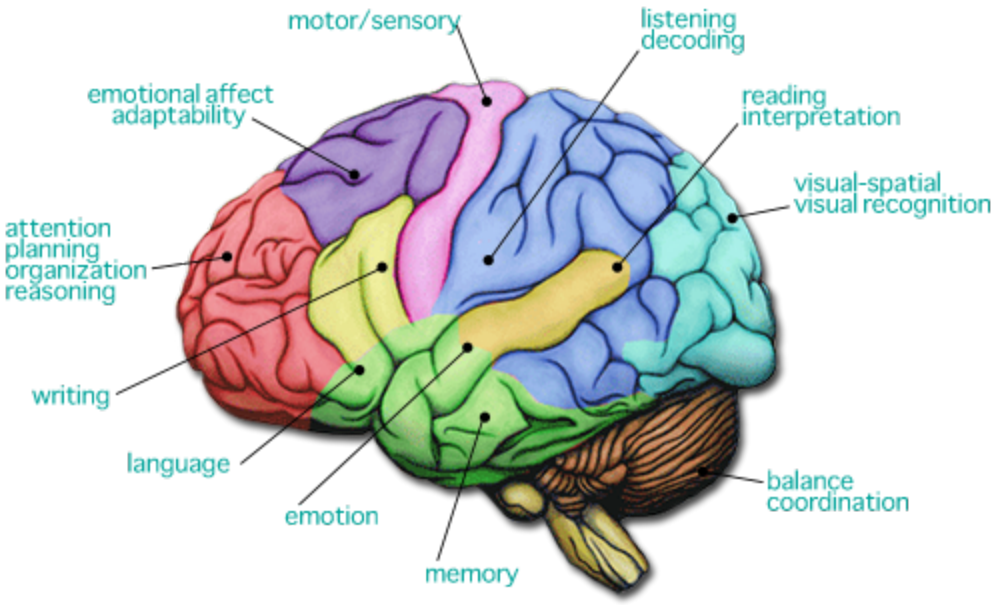
5. Discuss how the steps you listed in step 3 could be controlled with the mind. What would a person need to think in order to complete the necessary steps?

6. Play the game or use the device. Have a friend or family member record everything they see you do and hear you say (actions/emotions). Discuss how this data may impact a person's ability to control the game/device with their mind.

7. Discuss at least one thing that you learned about yourself and one thing that you learned about your game/device from completing this project.

8. Look at the provided diagram of the brain. Explain which areas of the brain you use to complete the game/task. Note: You will probably incorporate all/most of the areas.

- Memory
- Emotion
- Language
- Writing
- Attention, Planning, Organization, Reasoning
- Emotions, Adaptability
- Motor /Sensory (Large Movements, 5 Senses)
- Listening, Decoding
- Reading, Interpretation
- Visual/Spatial
- Balance, Coordination


motor/sensory
listening
decoding
emotional affect
adaptability
reading
interpretation
visual-spatial
visual recognition
attention
planning
organization
reasoning
writing
language
emotion
memory
balance
coordination