

Teacher Guide for ODYSSEY

September 2010: Am I a Borg, Yet?

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INTRODUCTION: Take a survey: Who would/would not want to be a bionic person. Randomly ask students why they answered that way. After the discussion ask students what would be the benefits of being a bionic person. Have them give reasons to support their answers. Then ask what would be the benefits of not being a bionic person and give reasons to support these answers. Post survey results and answers with reasons around room. At the end of the lesson redo the introduction. If some students changed their minds, ask what was the reason that caused them to change their first choice.

WHOLE GROUP ASSIGNMENTS: Have students read the following articles:

Robot Arm of the Future p.2
Skin Put: Your Skin is the Keyboard p.2-3
Blind soldier sees with his tongue p.4-5
Planes, Steer Clear! Eyjafjallajokule Is Here p.4-5
Mind Reading is Here p.5
Where are you, Arm? p.9
From Legos to Limbs p.11
Going Bionic! p.24-25
The Human Enhancement p.34-36
How I Became a Borg p.37-39

After reading the articles have students pick 3 articles to with. Create a trifold. Label each column with the title of each article. List facts about each article. For each article write 5 questions that the 5 W's (Who, What, When, Where, Why). When completed, pair up and ask each other your questions for a discussion.

SMALL GROUP ASSIGNMENTS: Divide students into groups of 3 or 4 students. Have them read an assigned article, and then they can use questions to guide their discussion. After they have read and discussed article, have them create a presentation to explain their article to the rest of the class. Create a visual such as a chart, poster, graph, or power point to use in their presentation. Could do presentation as a lecture, skit, or interview format.

FROM CAPTAIN HOOK TO LUKE SKYWALKER (p.6-10)

1. Who are Captain Hook and Luke Skywalker?
2. Why would the authors use Captain Hook and Luke Skywalker in this article?
3. What do these terms mean? (Make a T-chart to display answers)
 - a. Avatars
 - b. Prostheses
 - c. Amputees
 - d. Intention
 - e. Motor nerves
 - f. Sensory nerves
 - g. Mechanoreceptors
4. How were prostheses powered before bionics?

5. Which amputee is this the common type of device used still?
6. What are some of the problems with prosthetic arms?
7. Why did Dr. Kuiken get into the field of bionics?
8. What makes normal movement so free and natural?
9. How did Kuiken devise a way to move the bionics?
10. What is the purpose of the patients watching his/her Avatar arm on the TV?
11. What benefit do the engineers receive from the Avatar?
12. What do the engineers hope for in the future with prostheses?
13. What does the quote." An interdisciplinary approach and co-operation are keys to this field." mean?

ALL ABOUT ABILITY: USING A PROTHETIC LIMB 0p.12-15)

1. What do these terms mean? (Make a T-chart to display this information.)
 - a. prosthetic limb
 - b. amputation
 - c. prosthetist
 - d. physical therapist
 - e. occupational therapist
 - f. rehabilitation center
 - g. upper limbs
 - h. lower limbs
 - i. passive hand
 - j. amputees
2. Why might amputees outgrow their arms and legs?
3. How might someone become an amputee?
4. How does replacing a natural limb with prostheses create a challenge?
5. What team of professionals helps an amputee?
6. How does this team of professionals help an amputee?
7. Create a Venn- diagram to compare/contrast challenges/difficulties of lower and upper limb amputees.
8. What does an upper limb need to relearn? Explain why this is necessary.
9. Why would young amputees try different hand styles over time?
10. Why might kids who lose a limb due to sickness or injury often have a very tough emotional adjustment?
11. Where can there kids find help
12. Can amputees still do what you do?
13. Brainstorm what you could create to make someone's life richer, more enjoyable, and full of fun.

SECOND SIGHT (p.16-19) {Might have a larger group for this article and divide into how we see, how we lose sight, and Bionic vision. After they have read and discussed their parts, then work together to create one presentation.}

1. What do these terms mean? [Create a T-Chart to display your answers.]
 - A. cornea
 - B. iris
 - C. retina
 - D. pupil
 - E. photoreceptors
 - F. rods
 - G. cones
 - H. optic nerve
 - I. thalamus

- J. visual cortex
 - K. temporal/partial lobes
 - L. Retinitis Pigmentosa (RP)
 - m. Macular Degeneration (MD)
 - N. prototype
 - o. Pixels
 - P. voltage
 - Q. biocompatible
 - R. ab-externo
 - S. millivolts
2. Draw and label an eye. (Use p.17 for example)
 3. Draw a flow chart to explain how we see.
 4. What is Retinitis Pigmentosa and Macular Degeneration?
 5. Why is the hope that people with RP and MD might be able to have their vision restored?
 6. How does Radio Vision work?
 7. What advances in many areas have helped in the perfecting of bionic vision?
 8. Why is bionic vision unsuitable for people who have never had vision?
 9. What are the results of the laboratory testing so far?

“SUGAR” MATH 101: LIVING WITH AN INSULIN PUMP (p.20-22)

1. What do these terms mean? (Create a T-chart to display your results.)
 - a. carbohydrates
 - b. insulin
 - c. diabetes
 - d. Type I diabetes
 - e. Glucose
 - f. Type II diabetes
 - g. Pancreas
 - h. “Sugar” math
 - i. CGM
 - j. Algorithm
2. What is the job of the pancreas?
3. What happens when insulin is absent?
4. Create a trifold comparing Normal/Type I/Type II.
5. How in the past did type I diabetes regulate their blood sugar?
6. What can they do now?
7. How does “sugar” math work?
8. What are the symptoms of diabetes?
9. How does a normal pancreas act?
10. How does the pump work?
11. What are the differences between the pancreas and the pump?
12. What are researchers working on now to help?
13. What would this invention include and how would it work?
14. What do the scientists need to perfect and what would it do?
15. Try “sugar” math for a day.

FOUR INCREDIBLE CYBORG CREATURES! Create a four-column chart and label:

Winter the Dolphin	Motala and Mosha The Elephants	Beauty the Bald Eagle	Tonka the Turtle

List information on each Cyborg Creature that describes them, their injury, and their prosthetic replacement. Compare and contrast them.

READ, RELAX, ENJOY...

Gee, Mary Catherine, Isn't It Bionic? (p.26-29)

Afterman (p.30-33)

EXPLAIN...

Have the students write an essay on "Are Bionic Bodies Better?" Have them pick a side –yes or no- and defend it by using details and information from what they read, discussed, or was presented to them.