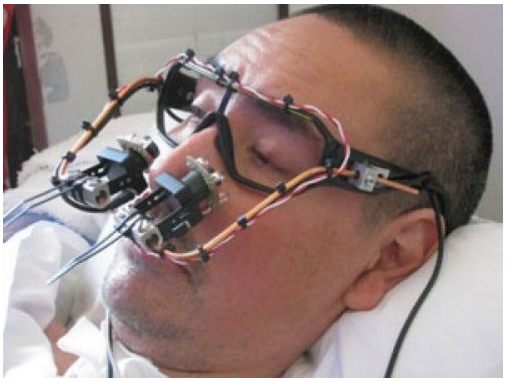
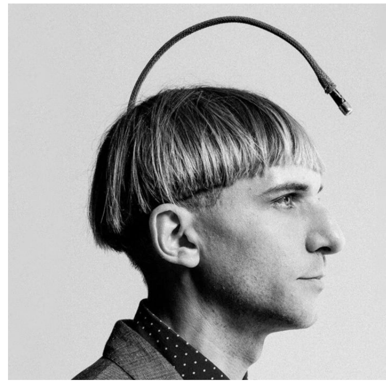
Biomechanical Cyborg Design Lesson - For Teachers

Presenter: Dr. Nettrice Gaskins





Unit Title: Biomechanical Cyborgs	Grade Level(s): 6-8
Subjects/Topics: Engineering Technology and Applications of Science; Art	Time Frame: 3 hours
Designer(s): Dr. Nettrice R. Gaskins	
Key Terms: cyborg, biomechanics, Afrofuturism, reappropriation, mapping, prototype, cypher Materials: found objects, paper, pens/pencils, scissors, box cutters Resources: Internet videos, design brief (for students)	

Stage One
Establish Goals: Students learn about biomechanics – the mechanical laws associated with the movement or structure of living organisms – and then create Afrofuturistic cyborgs using found materials and electronics, if time allows. Teachers learn how to integrate biomechanics into STEAM disciplines through learning core biomechanics concepts and culturally relevant, inquiry-based learning.

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<tr>
<td>Understandings:
Students will understand that…
Re-appropriation can be found in many cultures around the world, including popular culture
Artists and cultural practitioners use knowledge of biomechanics and technology
Examples in contemporary art and culture are relevant to biomechanics</td>
<td>Essential Questions:
What is a cyborg? Name some examples, including in Afrofuturism and comics.
What do you want your cyborg part to include? How will you enhance the body part to make it better?
What are the elements of your chosen body part? How does it work?</td>
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<td>Students will know…
How to identify design/engineering processes
How sketching and diagramming is used to describe a problem or solution to a problem
How to build a prototype/model, testing, and redesign of a cyborg part
How to discuss and compare artistic, natural, and biomechanical designs</td>
<td>Students will be able to…
Document and explain cyborgs
Identify cyborgs in art and media
Design cyborgs parts based on a concept
Watch and discuss the work of culturally diverse artists who incorporate cyborgs in their work</td>
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<th colspan="2">Stage Two - Assessment Evidence</th>
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<td>Performance Tasks:
Researching the history of cyborgs
Selecting one cyborg character and part as the basis for a project
Mapping ideas, objects or devices from their world that represent biomechanical/cyborg concepts
Create a cyborg part based on a concept
Present the cyborg part to a group</td>
<td>Other Evidence:
Showcase or exhibition at school-wide or community event</td>
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Stage Three - Learning Plan
Title: Biomechanical Cyborgs Summary: Students learn about biomechanics and then create Afrofuturistic cyborgs using found materials and electronics, if time allows.

Core Ideas (NGSS):

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions
- ETS1.A: Defining and Delimiting Engineering Problems
- ETS1.B: Developing Possible Solutions

National Core Arts Standards: Program 6

- Anchor Standard #1: Generate and conceptualize artistic ideas and work
- Anchor Standard #2: Organize and develop artistic ideas and work
- Anchor Standard #3: Refine and complete artistic work
- Anchor Standard #9: Apply criteria to evaluate artistic work
- Anchor Standard #11: Relate artistic ideas and works with societal, cultural, and historical context to deepen understanding

Handouts:

Cyborg Design Brief

Resources:

Iyapo Repository (cards); Tempt1 “Getting Up”; DC Comics’ Cyborg; Marvel Comics’ Nebula; Onyx Ashanti; Neil Harbisson, Amber Case

Materials: found objects and articles (for inspiration), paper, storyboard templates, scissors, pencils, or markers

Duration: 3 hours

<u>Lesson Outline</u>

Lesson 1: 45 minutes

Introduction – 15 minutes

Cyborg is short for "cybernetic organism", which is a being with both organic and biomechatronic body parts. ... While cyborgs are commonly thought of as humans, they might also conceivably be any kind of organism.

Students should review their *design briefs* to be clear about expectations, ask clarifying questions, brainstorm and explore concepts.

Mini-Lesson – 10 minutes

Students learn about how different examples meet the criteria of the design brief and explore stories featuring relevant models or characters (fictional and real) to inspire and help them in their own journey.

Guided Practice – 10 minutes

Students explore *design concept mapping* by choosing a cyborg character (fictional and real) and, in groups of 2-3, they create a diagram that depicts suggested relationships between concepts/parts/ideas.

Activity – 15 minutes

Students think of new ideas to remix a cyborg part, using biomechanics (forces and torque, Newton's Three Laws of Motion). Students create field notes and collect materials to make a biomechanical prototype.

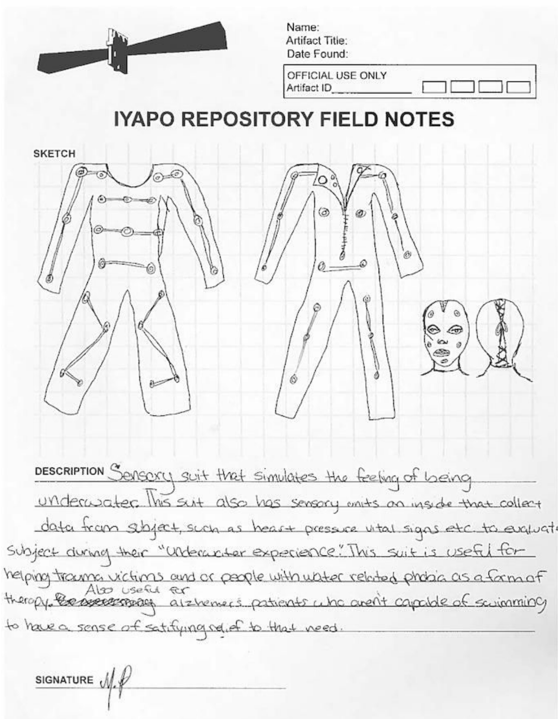
Performance/Exhibition (Share-Out) – 5 minutes
In groups, students share or display their work.

BREAK

Lesson 2: 45 minutes

Introduction – 15 minutes

A **prototype** is an early sample, model, or release of a product built to test a concept or process.



Iyapo Repository is a future resource library that houses a collection of artifacts created to affirm and project the African diaspora. It offers opportunities to generate and build technological cultural artifacts of the future. The project is situated between physical and digital spaces, between the present and the future.

Students look at 2-3 examples from the Iyapo Repository which were created based on Afrofuturism. Video

Mini-Lesson – 10 minutes

Show an example of a biomechanical prototype, discuss how it was made and how it works.

Guided Practice – 10 minutes

Give students a design challenge to create things that are held together without tape or some other constraint.

Activity – 15 minutes

Students use their design concept maps, field notes, materials and supplies to begin creating their biomechanical cyborg prototypes.

Performance/Exhibition (Peer/Design Review) – 10-15 minutes
Students participate in a peer review, which consists of a gallery walk with each group providing constructive critiques for the projects in development.

BREAK

Lesson 3: 45 minutes

Tinkering AKA *technological doodling* is a method that requires testing and exploring ideas, especially with low-cost, existing or found materials. This may include paper circuits/electronics, if time allows.

Students spend 30 minutes tinkering with their prototypes and finishing their projects.

Performance/Exhibition (Final Showcase) – 10-15 minutes
Students share or display their work.