

COOPER HEWITT



Smithsonian Design Museum



STUDENT DESIGN CHALLENGE #THINKOUTSIDE

GRADE LEVEL:

9–12

LESSON TIME:

4 class periods

INTRODUCTION:

For the Cooper Hewitt, Smithsonian Design Museum Student Design Challenge, high school students have been tasked with creating an original design for an outdoor chair inspired by an object from the museum's collection. This lesson was developed to complement the Student Design Challenge, but may be used to introduce students to chair design and related principles of design thinking. Using Cooper Hewitt's design process over four class periods, teachers will be able to facilitate students in designing a chair for Cooper Hewitt's Student Design Challenge. The lesson emphasizes iteration as students work through the design process of brainstorming and prototyping multiple designs. Submissions accepted through Feb. 21, 2016.

PLEASE NOTE: Only individual entries will be accepted for the Student Design Challenge. Group projects are not eligible for consideration.

OBJECTIVES:

Students will be able to:

- Analyze and interpret objects from Cooper Hewitt's collection.
- Design a chair based on contest guidelines for the Student Design Challenge contest
- Understand the role and needs of the user in chair design.

RESOURCES:

Beautiful Users exhibition at Cooper Hewitt

<https://collection.cooperhewitt.org/exhibitions/51669015/>

Posters, The Measure of Man (Male and Female), 1969

<https://collection.cooperhewitt.org/objects/51497617/>

Examples of Written Text in Professional Chair Designs:

<https://collection.cooperhewitt.org/objects/18624563/>

<https://collection.cooperhewitt.org/objects/18624569/>

<https://collection.cooperhewitt.org/objects/18627421/>

<https://collection.cooperhewitt.org/objects/18627075/>

MATERIALS

Pencils and paper for writing and for sketching designs

Index cards

Worksheets

Slideshow

VOCABULARY

Aesthetics

Brainstorm

Construction

Design

Designer

Ergonomics

Sketch

Prototype

User

PROCEDURES

Class period one: INTRODUCTORY DISCUSSION AND SLIDESHOW FOR PHASE ONE: OF DESIGN PROCESS: Defining Problems (45 minutes)

To start, become familiar with Cooper Hewitt's guide to the design process for educators

Assemble an assortment of 3 or 4 outdoor chairs (or images of chairs). Ask students to share their thoughts on what they anticipate each chair will feel like when they sit in them. Other discussion questions:

- Which do you find most aesthetically pleasing? Why?
- Which chair do you think will be most comfortable?
- Which chair do you think will be most supportive?
- What do you think the texture of each chair is like?
- Do you think the chairs are heavy or light?
- How did the designer plan for the user's body to interact with each chair?
- What purpose do you think each chair was designed for?
- Do you think there are any limitations in these designs?

Then have each student sit in each of the chairs and complete the attached Observation Worksheet. The worksheet helps students look closely at the chairs and examine their individual elements.



Observation Worksheet Questions:

- Materials: What materials were used to make the chair?
- Support: In what ways is the chair supporting your body?
- Comfort: Do you feel comfortable sitting in this chair?
- User: Who do you think is the intended user for this chair?
- Aesthetics: In what ways is the chair aesthetically appealing?
- Construction: How do you think the chair was constructed?
- Experience: How did actually sitting in this chair compare with how you thought it would feel?

Introduce the terms “ergonomics” and “user.” Using Cooper Hewitt’s collection, introduce students to the *Measure of Man* posters designed by Alvin Tilley. Design for human factors, also known as ergonomics, requires knowledge of bodily dimensions. Tilley created these famous drawings of typical Americans, affectionately known as “Joe” and “Josephine,” based on data used by the United States military (for men) and the fashion industry (for women), from which Tilley was able to determine a range of percentiles from 1 to 100. Joe and Josephine represent the mean (50th percentile). Students should discuss the following questions in response to the *Measure of Man* posters:

- Why might it be helpful for designers to make products based on the size of an average person? (It gives designers a starting point to work from that will work with a large portion of the population’s size and abilities.)
- When might it not be helpful for designers to create products solely based on the average-sized and able person? (The “average” size does not account for people who are above or below average in size. Nor does it account for people with different needs.)
- How does this idea of designing for the average person translate to chair designs? (e.g., most chairs are a standard height, etc.)
- In what ways might the idea of the support that a chair provides be affected when designers are only designing for the average person? (e.g., some people may need more lumbar support due to health issues, etc.)

Introduce the anatomy of a chair. Start examining the basic elements that make up a chair using this slideshow.

CLASS PERIOD TWO

Phase two of the design process: Brainstorming Chair Design Ideas (45 minutes)

Review the Cooper Hewitt Student Design Challenge requirements with students. In particular, take note of the intended users, design requirements, material constraints, and evaluation criteria:

INTENDED USERS:

People of all ages and sizes visit The Arthur Ross Terrace and Garden and will be using your outdoor chair. Some will be museum visitors; others will be neighbors and city explorers using the garden to enjoy a cup of coffee, take a break from a bike ride, relax, or read a book. Think about where people like to sit in gardens—some prefer to sit in the sun; others prefer a shady nook. Think about what people like to do in a garden and how your chair will enhance their experience. Think about what people like to do in a garden and how your chair can fit this setting.

DESIGN REQUIREMENTS:

- Easy to use
- Comfortable
- Movable
- Durable
- Easy to clean and maintain
- Safe

MATERIAL CONSTRAINTS (Note that your outdoor chair may be made from the following materials used alone or as a combination):

- Steel
- Aluminum
- Wrought Iron
- Wood
- Faux wood
- Wicker
- Rattan
- Rope
- Outdoor Fabric
- Sorry! Molded plastic is not allowed.



EVALUATION CRITERIA:

The winning outdoor chair design will be a clear, inventive and compelling design. It will combine both beauty and functionality.

- Overall Design Excellence
- Creativity
- Clarity of your design's connection to the inspirational object
- Functionality
- Outdoor Durability
- Safety for public use

Students must select ONE of twelve identified objects from Cooper Hewitt, Smithsonian Design Museum's collection. The twelve objects can be found here.

Brainstorming is an important step in the design process.

TIPS

- Encourage wild ideas
- Defer judgment
- Write everything down
- Go for quantity

To loosen up students' thinking in their initial chair designs, turn the challenge's design requirements and material constraints into flash cards using index cards. Have students start by choosing one of the twelve collection objects. List each design requirement and material on its own index card. Place all the design requirements in one container and all the material flash cards in another. Go around the room, and have students pick one design requirement and one material and take note of their selections. Once each student has their mash-up of design requirement and material, ask each student to draw 10 different thumbnail sketches of their chair design. Note that each sketch should be a different design and be inspired by the collection object chosen.

Ask students to share their ideas for their designs with a partner. In particular, ask if them to discuss what they found difficult about the design process due to limited requirements and materials. Use the peer-to-peer feedback worksheet to facilitate further discussion.

CLASS PERIOD THREE AND FOUR: FINALIZING THE DESIGN

PHASES IN DESIGN PROCESS:

Prototyping + Making & Testing + Evaluating (90-180 minutes)

Now, students should reflect on their initial designs to see which design they would like to pursue as an entry for the contest. The teacher should continue to facilitate students during their design process. Continue to ask clarifying questions about their designs.

Note that students' final designs do not have to include every little detail of fabrication. There may be some elements that are difficult to draw on paper, but would benefit from a written description. Cooper Hewitt's collection includes examples of professional designers who have added written text to their sketches in order to better articulate a material or fabrication choice, for instance. See here for examples.

Typically designers test their prototypes with users and interview them about what works and what doesn't. After gathering feedback, they work on improving their prototype. You can team up students to

TIPS

- Build to think
- Fail early to succeed sooner
- Don't fall in love with your idea
- If a prototype/early design fails, are there elements that you could still use?

Is your class ready to submit their designs for the contest? Note that each student's work has to be submitted individually. Group submissions will not be permitted. Review the full contest instructions here.

ASSESSMENT

Students will be using peer-to-peer feedback during their brainstorming. Teachers should use the evaluation criteria for the *Student Design Challenge #ThinkOutside* to assess student work.



ENRICHMENT

Look around, and think outside of the classroom. Point out things that have been designed with a user in mind, and come up with ways in which these items could be improved.

STANDARDS

COMMON CORE

CCSS.ELA-LITERACY.CCRA.R.1-3, 7, 9; W.1, 2, 8, 9; SL.1, 2, 6; L.1, 2, 4, 6

NEW YORK LEARNING STANDARDS

Mathematics, Science, and Technology Standards 1, 6, 7

English Language Arts Standards 1 & 3

The Arts Standards 3 & 4

Career Development and Occupational Studies Standards 1-3b

Social Studies Standard 4

Mathematics, Science, and Technology

Standard 1: Analysis, Inquiry, and Design

Standard 6: Interconnectedness

Standard 7: Interdisciplinary Problem-solving

English Language Arts

Standard 1: Language for Information and Understanding

Standard 3: Language for Critical Analysis and Evaluation

The Arts

Standard 3: Responding to and Analyzing Works of Art

Standard 4: Understanding the Cultural Contributions of the Arts

Career Development and Occupational Studies

Standard 1: Career Development

Standard 2: Integrated Learning

Standard 3a: Universal Foundation Skills

Standard 3b: Career Majors

Social Studies

Standard 4: Economics

CCSS.ELA-LITERACY.CCRA.R.1

Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

CCSS.ELA-LITERACY.CCRA.R.2

Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.

CCSS.ELA-LITERACY.CCRA.R.3

Analyze how and why individuals, events, or ideas develop and interact over the course of a text.

Integration of Knowledge and Ideas:

CCSS.ELA-LITERACY.CCRA.R.7

Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

CCSS.ELA-LITERACY.CCRA.R.9

Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

CCSS.ELA-LITERACY.CCRA.W.1

Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.

CCSS.ELA-LITERACY.CCRA.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

CCSS.ELA-LITERACY.CCRA.W.8

Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

CCSS.ELA-LITERACY.CCRA.W.9

Draw evidence from literary or informational texts to support analysis, reflection, and research.

Range of Writing:

CCSS.ELA-LITERACY.CCRA.SL.1

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

CCSS.ELA-LITERACY.CCRA.SL.2

Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.CCRA.SL.6

Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate.

CCSS.ELA-LITERACY.CCRA.L.1

Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

CCSS.ELA-LITERACY.CCRA.L.2

Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Vocabulary Acquisition and Use:

CCSS.ELA-LITERACY.CCRA.L.4

Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

CCSS.ELA-LITERACY.CCRA.L.6

Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.