COOPER HEWITT
WHAT IS DESIGN?
TEACHER RESOURCE PACKET

COOPER HEWITT DESIGN K-12

TABLE OF CONTENTS

Smithsonian Design Museum

COOPER
HEWITT
DESIGN
K-12

September 2014

Dear Educator,

Thank you for registering for Target Design K-12: *Design in the Classroom*. This exciting program brings Cooper Hewitt, Smithsonian Design Museum's compelling impacts of design on daily life to your classroom! This Teacher Resource Packet is about *What is Design?,* an introductory workshop intended for all audiences, including those who are new to design thinking.

What is Design?, a 45-minute workshop, is facilitated by a Design Educator in your classroom. Upon completion of the workshop, students will have a basic understanding of design and will have solved a challenge through prototyping. To help you and the students prepare for the workshop, please read page one carefully.
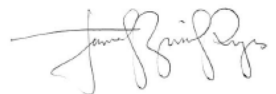
This packet also provides several resources on how to continue integrating design thinking connections into your classroom curriculum after the workshop, including recommended activities and selected key lesson plans from Cooper Hewitt's Educator Resource Center (ERC). ERC has over 400 free standards-based K-12 design-focused lesson plans written primarily by classroom teachers from around the country.

We enjoy receiving feedback from teachers about their experience with the workshop. Within a month of your workshop you will be emailed a brief survey. Thank you in advance for taking time to provide your feedback so that we can continue to offer a high quality program for New York City's K-12 schools.

Sincerely,

Kimberly Cisneros
School & Tours Manager

James B. Reyes
Education Assistant

COOPER HEWITT DESIGN K-12

PREPARING FOR THE WORKSHOP

We are looking forward to coming to your classroom to introduce the workshop and engage your students. There are a few things we recommend that you do prior to our arrival.

TAKE AN ACTIVE ROLE

The Design Educator will send a confirmation/introduction email prior to the program. Please respond and provide any additional information about your students (e.g. learning needs and modifications) so we can ensure a successful experience for all participants. The program is forty-five minutes and the Design Educator will need your support helping students stay on task. You must remain in the classroom at all times with the Design Educator.

PREPARE THE CLASSROOM

Please have the computer and projector ready for the Design Educator to show his/her PowerPoint presentation on a USB drive. Before the program begins, put your students in groups and adjust the classroom so they are seated to immediately begin group work. Kindergarten and first grade students will work in pairs. All other students will work in groups of three or four.

PREPARE YOUR STUDENTS

Tell the students that a Design Educator is coming from Smithsonian *Cooper-Hewitt, National Design Museum* to do a hands-on program about design. Students will be encouraged to share their ideas, although due to time limitations it is not always possible. If this is the case, please assure students that they can share with you after the visit.

WATCH A VIDEO

Throughout this packet there are recommended videos. All videos are part of the *What is Design?* Video Playlist found at http://www.cooperhewitt.org/education/school-programs/designk12/dk12videos/.

RECOMMENDED VIDEO:

INTRODUCTION TO PROGRAM

COOPER HEWITT
DESIGN K-12

DESIGN THINKING CONNECTIONS

Design thinking can support what you are already doing in the classroom. In addition to ERC lesson models of K-12 cross-curricular connections to design across grade levels, design thinking can be found in the nation's current integration of Common Core Standards and emphasis on S.T.E.A.M. subjects.

COMMON CORE STANDARDS

These standards focus on the 21st century skills that allow students to be successful in school and career readiness. These can be found by visiting http://www.corestandards.org/about-the-standards. Our program includes many of the same high order skills:

- Using personal experience and knowledge to begin understanding the purpose and function of designed solutions to everyday challenges
- Collaborative problem solving with teams to think critically about solutions
- Visualizing solutions through prototyping

## S.T.E.A.M. (SCIENCE, TECHNOLOGY, ENGINEERING, ART, MATHEMATICS)

These key subjects are selected to help students prepare for future careers. Here are examples of how designers in various disciplines might use the S.T.E.A.M. subjects:

- *Product Designers* use their understanding of engineering and mathematics to make the millions of objects we use every day, from your toothbrush to your classroom furniture.
- *Landscape Architects* incorporate their understanding of science and art to create beautiful and engaging environments in which people live, work, and play.
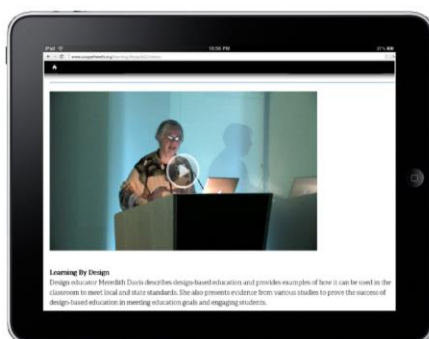- *Graphic Designers* combine technology and art to communicate ideas through images and text.

COOPER
HEWITT
DESIGN
K-12

RECOMMENDED VIDEOS:
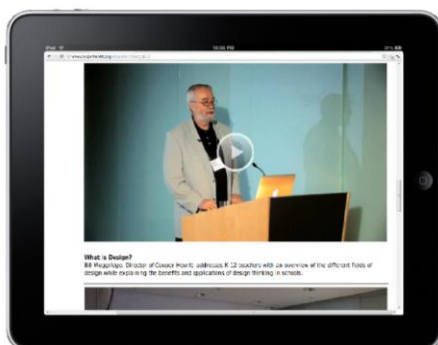
WHAT IS DESIGN?
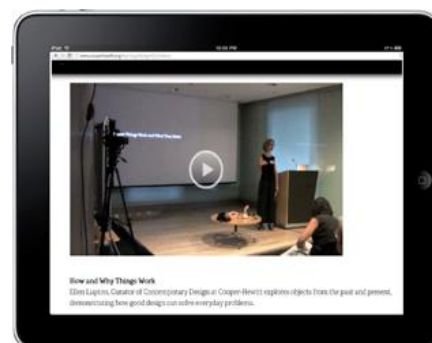
HOW AND WHY THINGS WORK

LEARNING BY DESIGN

COOPER HEWITT
DESIGN K-12

WHAT IS DESIGN? WORKSHOP VOCABULARY

Design Challenge	A difficulty or challenge that can be solved through design.
Design	To make something for someone who needs to solve a problem.
Designer	A person who designs; one who creates a new object, idea, or plan.
Design Process	The steps you take to solve your challenge.
Design Solution	The way, idea, or answer to a design challenge/problem.
Form	The shape and structure of an object.
Function	The way something works. *e.g., the function of a paper clip is to fasten things together.*
Materials	The items you are using to represent your ideas. *e.g., foil paper represents metal*
Needs	What the user must have in order to use the design successfully.
Prototype	An original model on which something is patterned.
Team	A group working together on a common goal or activity.
Solution	The way, idea, or answer to a problem. There can be more than one solution.
User	A person who operates or experiences the design.

COOPER HEWITT
DESIGN K-12

AFTER THE WORKSHOP

Now that you have experienced the workshop with your students, we recommend you continue to explore design thinking in the classroom. Here are a few recommendations to help get you started:

RECOMMENDATION 1:

DESIGN ANOTHER PROTOTYPE USING THE SAME CHALLENGE

Now that you've experienced the workshop and have had an educator model how to facilitate the design process, you can do it again. The Design Educator will likely have two to three teams share their prototypes during the workshop. Have each team keep their prototype and write down their challenge. See Appendix A to review workshop materials and challenge questions. At a later time, give each group an opportunity to share their prototypes with the class to ask follow-up questions and provide feedback.

Teacher Prompt:
- What was your challenge?
- Who is your user and how does your prototype work?
- What do your materials represent (e.g., does foil = metal or water)?

Each team will take the feedback and design a second prototype to improve their design solution. Provide an opportunity for the teams to share again.

Follow-up prompts:
- What feedback did you incorporate into your new design?
- How was doing a second prototype different?
- How do the two compare?

RECOMMENDED VIDEO:
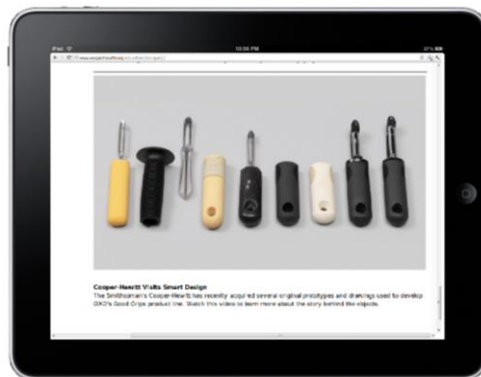
COOPER HEWITT VISITS SMART DESIGN

See Appendix A: OXO Peeler Background

COOPER HEWITT DESIGN K-12

RECOMMENDATION 2:

EXPLORING DESIGN-BASED LESSONS

Looking to extend design learning in your class? Explore our free Educator Resource Center (ERC). On pages 10 & 11 you will find recommended lesson plans from the ERC website http://dx.cooperhewitt.org/resources/. These interdisciplinary, design-focused lesson plans focused on project-based learning, critical thinking skills, and problem solving. You can search for lesson plans by subject area, grade level, or category.

To create an account, go to http://dx.cooperhewitt.org/resources/. Click "Register here" in the top right corner. Enter your information and then click "Save." Once registered, you'll find:

- Videos of talks and workshops from top design thinkers
- Online discussion board with fellow educators
- Design-focused activities, printouts, apps videos, books, and articles

RECOMMENDATION 3:

DESIGN A PROTOTYPE USING YOUR CURRICULUM

This time you can design a challenge questions based on your curriculum which will give students an opportunity to continue to build on their understanding of the design process. You may provide the challenge or ask the students to come up with their own. Keep in mind that they are thinking of problems that have design solutions.

Tips on posing a challenge:

- It is important that the challenge is open-ended to encourage different interpretations and creative thinking. A poorly-worded challenge might read something like, *"Design a water bottle."* Effective wording would be, *"Design a way to transport water on the go."*

We encourage you to share your lesson plan on the ERC website. Log on and then go to "Create a Lesson Plan."

RECOMMENDED VIDEO:

READY, SET, DESIGN!

See Appendix B: *Ready, Set, Design!*

COOPER HEWITT DESIGN K-12

EDUCATOR RESOURCE CENTER (ERC)

These lesson plans were selected as examples of how you can make cross-curricular connections to design across grade levels.

Mathematics ●
Technology ●
Science ●
Social Studies ●
Language Arts ●
Arts ●

KINDERGARTEN & GRADE 1

HELP! HELP! I CAN'T GET DOWN! ●●●●

Students will engage in active problem solving as they create a way to transport a stuffed animal from a high place to a low place using only materials provided or found within their classroom.

WHAT SHOULD A PLAYGROUND LOOK LIKE? ●●●

Students will each design a playground that will reflect their interests and allow for opportunities to share, take turns, listen, and talk.

MY OWL BABIES MISS MOMMA ●●●

This lesson will engage students in the steps of the design process as they build homes for owl babies.

MEASURING RAINFALL ●●

Students will design an object to measure rainfall.

GRADES 2-5

LE SCHOOL SAC ●●

Students will look at how their bags are designed to assess how to improve them to better fit their use and needs.

ON THE GO! FORCES AND MOTION ●●●

Through the process of designing a car that travels the fastest and the farthest, students will investigate types of motion, forces, gravity, friction, and incline.

SUMMER VEGGIES ALL YEAR ●●

Students will design growing systems to provide warmth and nutrients to summer vegetables in order for them to grow year round.

CREATE A WORD BANK ●

This lesson challenges students to design a useful word bank.

JUDGING A BOOK BY ITS COVER ●●

Using a piece of creative writing as inspiration, students will design and produce a book that reflects one of the piece's themes.

DETRACTING DISTRACTION ●●●●●

Students will identify a classroom problem and figure out feasible solutions.

COOPER HEWITT
DESIGN K-12

GRADES 6-8

REDESIGN MY STREET ●●●

Students will explore the problems of pedestrian safety and redesign a street and/or intersection.

THE ENERGY EFFICIENT CHEMICAL HOUSE ●

Students will be challenged to design a house that can effectively heat and cool itself using only one heating source and one cooling source.

DESIGNING A MYTHICAL CREATURE ●●●

Students will brainstorm a list of natural phenomenon and will design a mythical creature to explain one of the phenomenon.

CREATING/IMPROVING THE INTERNATIONAL SPACE STATION ●

Through research, students will identify challenges that astronauts experience while living in space and will develop innovative solutions for these difficulties.

60-30-10 ●

Students investigate the concept of how percentages are used by designers. Students will decorate the same room using three different percentages of colors.

SOIL, DESIGNING THE SMALL FARM OF THE FUTURE ●●

Students will use design thinking to evaluate current challenges and to develop farming solutions that are sustainable and more environmentally friendly than current offerings.

GRADES 9-12

VIEWING DEVICE: NEW PERSPECTIVE ●

The lesson consists of a design challenge to create a simple device that will allow the user to see a different perspective of the space around them without moving.

MICROBIOLOGY DESIGN CHALLENGE ●

Students will be asked to design a solution for obtaining clean drinking water in undeveloped countries.

FLY FLY AWAY ●●●●

Students will use everyday materials to carefully design a kite. In the process of designing their kites, students will discover how their environment and their supplies will impact their design.

T-SHIRT DESIGN FOR REAL ●

Students will learn the basic elements and procedures of design as they engage in their production of T-shirts.

A TALL SHIP AND A STAR TO STEER HER BY ●●●●●

This unit is an introduction to transportation systems that will culminate with the students designing a wind-powered water transportation device.

APPENDIX A: OXO PEELER BACKGROUND

OXO (pronounced Ox-O, not o-x-o) is dedicated to providing innovative consumer products that make everyday living easier. The company advocates access to well-designed merchandise for all users, regardless of age, economic status, or physical health. Sam Farber, a retired cookware entrepreneur, started OXO International and produced a line of ergonomically superior kitchen and garden tools under the brand name Good Grips.

Farber was inspired by his wife Betsy's inability to cook and prepare food with conventional utensils because they caused arthritis pain. He realized that the market was not meeting the needs of individuals with disabilities and that many people would benefit from improved cooking utensils. With the introduction of its iconic Swivel Peeler, OXO challenged the notion that design and function are mutually exclusive. OXO set a new standard by creating effective, attractive tools that people of all ages and abilities could use.

DESIGN PROCESS

The following are observations that prompted Sam Farber's re-design:
- The original peeler is made of metal and painful to use.
- The handle is uncomfortable to grip.
- It does not provide a safe grip while wet.
- The peeler should appeal to a broad range of people.

He also considered the following during the prototyping process:
- The peeler is a necessity in any kitchen.
- Improve upon its limited usability and its ugly metal form.
- Peeler must be safe and comfortable to use.

DESIGN CHALLENGE

Design a peeler with a suitable material for the handle that would make a comfortable interface between the hand and the peeler and would also provide sufficient friction to prevent the handle from slipping in your hand when it gets wet.

IMPORTANCE OF TESTING PROTOTYPE WITH A USER

The final product was created after testing dozens of prototypes. Several different iterations of the peeler were developed and tested with the public, including chefs, cooks, general kitchen utensil users, New York arthritis groups, among others. The test users' insights were important assets in designing the Good Grips OXO peeler. The result was the use of Santroprene, a neoprene synthetic elastomer material with a slight surface friction. The material is soft enough to squeeze, firm enough to keep its overall shape, and capable of being cleaned in the dishwasher.
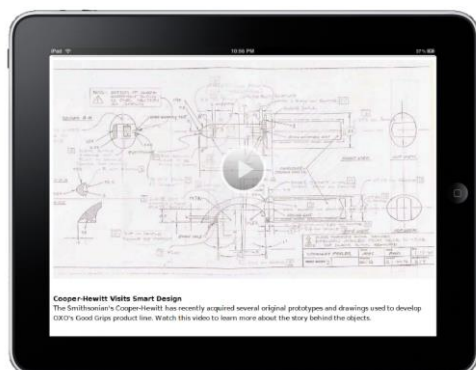
DESIGN IN THE CLASSROOM

After a closer examination of the OXO peeler, your students will be able to see the importance of the prototype within the design process. Iteration allows the designer to go beyond one solution and explore many possibilities. Students will only create one prototype in the *What is Design?* workshop and so will need to understand that it would take many more before coming to a final design.

The following photograph is included in the *What is Design?* workshop and nicely illustrates the numerous 3D models that were produced as prototypes during the design process for the Good Grips Team.

The *Cooper Hewitt visits Smart Design* video includes a brief interview with the Good Grips Team. The designers explain the many models and various design ideas that were revisited and improved upon to reach the final OXO peeler.

GOOD GRIPS TEAM

Cooper-Hewitt Visits Smart Design
The Smithsonian's Cooper-Hewitt has recently acquired several original prototypes and drawings used to develop OXO's Good Grips product line. Watch this video to learn more about the story behind the objects.

COOPER
HEWITT

Smithsonian Design Museum

Ready, Set, Design is a quick group activity.

It uses simple, inexpensive materials and is an effective tool for problem solving, creative thinking and team building. *Ready, Set, Design* is not just for designers but can be used by any audience as a way to engage in design thinking.

Objective

Participants are asked to solve an open-ended problem with time and material constraints. Working in small groups, solutions are developed quickly and yield surprising solutions that may not have been immediately obvious.

no glue, tape or scissors are allowed.

excluding these items forces participants to use materials more creatively!

Materials

* Paper lunch bags
* Challenge cards (can be a slip of paper or an index card)
* Fastener items (for example, pipe cleaners, rubber bands, paper clips, string)
* Surface items (for example, coffee filters, carboard squares, balloons, paper)
* Structure items (for example, straws, tongue depressors, wood skewers, tin foil)

Prep

1 Stuff one lunch bag for each team. (You'll divide your group into teams of 2–4). Each bag should contain two or three fastener items, two or three surface items, and two or three structure items.

Here's a sample bag with 3 rubber bands, 2 coffee filters and 2 straws:

you can give every team the same set of materials,

or you can give every team different materials.

both will yield interesting results!

2 Write a challenge on each card. Every team in the room can get the same challenge, or every team can get a different challenge—it's up to you.

The challenge will drive each team's conversation. It's important that the challenge is open-ended to encourage different interpretations and creative thinking.
A poorly worded challenge might read something like, "Design a water bottle." Effective wording would be, "Design a way to transport water on the go."

You can create your own challenge statements based on appropriate subjects for your group, or use one of ours:

For younger groups, under age 13:

"I need to protect myself from the rain."

"I need to bring my lunch to school."

"I need to collect and carry small things."

"I need to keep my hands warm."

"I need to carry groceries up several flights of stairs."

For older age groups, from teens to adults:

"I need to create a safe way to cook in a home with no electricity."

"I need to keep a new born baby warm in a place with no electricity."

"I need to collect and carry water."

"I need to create a safe light source for a home with no electricity."

"I need to purify water from a stream."

3 Put one challenge card in each bag. Don't worry about matching materials with challenges––remember that you want your teams to use the materials in surprising and creative ways!

With Your Group

1 Divide the group into teams of 2, 3, or 4.

2 Each team gets one of the bags that you prepared earlier.

3 Before the teams open the bags, introduce the activity and instructions.

*Here's the way we like to introduce Ready, Set, Design at Cooper-Hewitt:*

"Working in small teams, every group will receive a paper bag. In this bag you will find everyday materials and a challenge card. The first thing you're going to do is read your challenge card. Your team's job is to find a solution to that challenge using only the materials in your bag. You'll have 15 minutes to create a prototype∗ of your idea."

∗A prototype is a small model of your final design
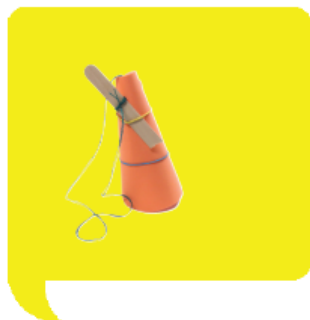
** remind the teams that the
prototype isn't meant to be
a perfectly rendered model,
but a rough physical sample
that demonstrates how the
idea will function **
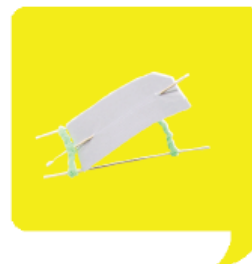
4 Give the group 15—20 minutes to **prototyp**e a solution using only the materials in their bag. Remind the teams that they can't design a solution that already exists!

5 When time is up, the groups present their solutions to the other teams. Ask a representative of each team to read their challenge card aloud and articulate how their solution addresses that challenge.

Want to dive into the design process a bit further?

Try introducing a brainstorming session for about 5—10min. This can give the group more time to think creatively before they start constructing their prototype.

Brainstorming guidelines to share with the group:

* Encourage wild ideas within the group. The sky's the limit! Sometimes it's the wild idea that helps form the final concept.

* Go for quantity. The more ideas the better.

* Write down or draw every idea the group has.

* One person speaks at a time.

* Defer judgment. In addition to never striking down an idea, If the group overly praises one member for their idea, it might limit the possibility of more ideas being expressed.

*This activity is based on Inna Alesina's "Inventomania Challenge."
Inna teaches design at Maryland Institute College of Art.*

For more activities and ideas in design thinking, visit cooperhewitt.org/education

BIBLIOGRAPHY

Jeavans, Christine. "A design for (long) life." BBC, January 14, 2005. Accessed June 5, 2012.
    http://news.bbc.co.uk/2/hi/uk_news/4079345.stm

OXO. "What is Santoprene?" (n.d) Accessed June 5, 2012. http://www.oxo.com/faq.aspx

Raven, Susan Richelle. "Guidelines for Designing Kitchen Appliances for the Elderly." Master's
    Thesis, Auburn University, 2006. Accessed June 5, 2012.
    http://etd.auburn.edu/etd/bitstream/handle/10415/265/RAVEN_SUSAN_15.pdf

Şen, Alper. "Application of Grounded Theory for Concept Analysis in New Product Development
    Process." Master's Thesis, İzmir Institute of Technology, 2006: 38-70.

For additional information please visit our website
http://www.cooperhewitt.org/education/school-programs/
Or contact us at **chtours2@si.edu**

Target Design K-12 is made possible by the generous support of ⊙