

Lesson Plan for Conceptual Models Using Slotted Cards

BRIEF DESCRIPTION:

(total time: 2 hours broken up into multiple sessions as needed)

This project is an introduction to brainstorming collaboratively and to exploring shelter designs addressing local community and environmental needs. Using slot cards, students collaborate in building prototypes of bus shelters. Students cut cardboard (or use note cards) and collaborate in teams to make these card models. Students write how their built-structures address community needs. This is a hands-on lead in exercise to prepare students for volume rendering sessions in Google SketchUp.

SPECIFIC OBJECTIVES:

- Students brainstorm and collaborate effectively in teams as they explore design ideas for multipurpose bus shelters.
- Students explore a design process as they identify and address address local community and environmental needs.
- Students compare and contrast brainstorm lists from their own and other student communities.
- Students demonstrate an understanding of plane and solid geometric objects and use this knowledge to show relationships and solve problems in creating a structure, using slot cards and connectors.
- The exercise facilitates a concrete understanding of math and visual arts vocabularies (balance, angle, parallel, co-planer, tangent, symmetry, perpendicular.)

ART AND DESIGN HISTORY CONNECTION:

Many architects and artist have explored with slotted cards as it is an elegant and simple way to take planer shapes and build solid geometry forms. Here is a resource image document: [Slot Shelters Reference Image Building Prototypes](#)

- Eames House of Cards, 1954, inspired Slot Shelters. Charles Ormond Eames, Jr (1907–1978) and Bernice Alexandra "Ray" Eames née Bernice Kaiser (1912–1988), American designers, made major contributions to [modern architecture](#) and [furniture](#). Their work in the fields of

industrial and graphic design, [fine art](#) and [film](#) are also well known.



Ray and Charles Eames, House of Cards, image permission for non commercial usage by MOMA Design Store

More information about

Eames: http://eamesgallery.com/cart/prod_subcat.php?id=4 http://en.wikipedia.org/wiki/Charles_and_Ray_Eames

- Contemporary artist, Damian Ortega's slotted tortillas:



Above: Damian Ortega, Módulo de construcción con tortillas 1998 Kurimanzutto, Mexico City © The Artist

- Below: Contemporary artist, Todd Gilens:
<http://www.follywog.net/projects/playingcards.html>

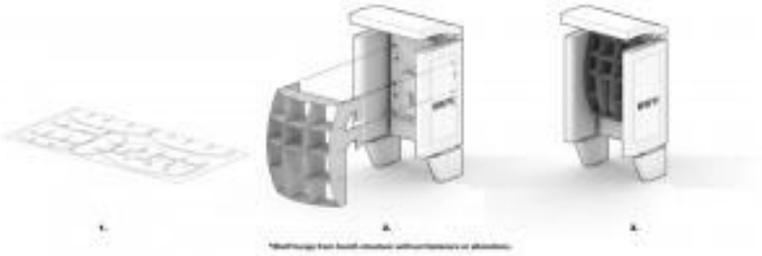


Above: Model Building by Todd Gilens. Image usage by permission of Artist.

- [Estante Publica](#), Brazilian bus shelter project which encourages collective participation in an urban setting.
- John Locke's [Dub 002](#) modular phone booth libraries.



John Locke's Dub 002 modular phone booth libraries.



Above: John Locke's phone booth library design

ESSENTIAL QUESTIONS:

Record collaborative brainstorming notes on the board and photograph. Share these notes with the Slot Shelter project website via blog posting to Slot Shelters website or post on a Picasa album and share with Slot Shelters via an email to corinne@okadadesign.com

- What is a built structure?
- What is the difference between personal space and public space?
- What kind of privacy one might need while out in public?
- What is a shelter?
- What kind of space does shelter require? Big or small? What makes you comfortable in a shelter? What makes you uncomfortable? Why do people need a shelter and when?
- Name some types of shelters that you know of. Ex. Some shelters are created during disastrous times (tsunami, tornadoes, storms, etc). Ex.: how did Japanese personalize space and how did they create shelters during the tsunami ordeal? Evacuees from Futaba, a town near the tsunami-crippled nuclear plant, rested in spaces divided by cardboard at Saitama Super Arena: http://photos.oregonlive.com/oregonian/2011/03/japan_earthquake_67.html
- What are local structure/shelters needs you might integrate into a bus shelter?

REQUIRED MATERIALS:

- Standard white flash cards or thin cardboard cut into 3"x 5" card. Pre-bundle 6 cards per student. One card in each bundle should have 6 pre-cut half inch slits. This will be the student's template card to cut the slits in the other cards. Teacher will want to pre cut one slot card per student. (Template is on Resources page)
- One printed page of the Slot Card Connector per student (pdf is on Resources page of site) for each student. They will be cutting these shapes out.
- Pencils, rulers, scissors, tape, colored pencils, and markers.
- Access to internet required to share sites and images during lesson.



- mini people for scale.
- solid colored paper to cover tables (for clean photography of models)
- optional: straws, pipe cleaners, wire, coffee cup holders and other found objects to build with.
- One Conceptual Model Team statement form for each team of 3-4 students (can be found on Resources page)
- Slot card template (can be found on Resources page)

DIMENSION GUIDELINES:

Since real bus stop shelters have a footprint of around 10' x 5' and are usually around 7' tall, encourage students to keep the scale and proportions of their structures within these dimensions. Having little scale model people help students keep their structures at a reasonable scale. The bus stop shelter must be only one story tall. Also, since you will be photographing these images and storing them in your class, you want to be sure that these models stay at a manageable size.

LESSON PLAN PROCEDURE:

1. Hand out 6 cards to each student. In each bundle of 6, one card should be pre-cut with the connector slits. Students will later use that card as a template to cut slits in their remaining five cards.
2. "We are going to explore building models of shelters and we are going to explore taking plane geometry shapes and creating solid geometry forms from them. But first, you have 30 seconds to build something with a roof, starting now! Think of a house of cards. It is OK if you cannot get your shelter to balance. This is just an exercise." (After the time is up, ask students if that was easy. Most will give an emphatic "No!") *There must be a reason that we don't see building created this way. It is unstable. Gravity works against us and nothing is joining the planes to assist in load bearing.*
3. Ask for two volunteer to come up to the front of the room and each must bring up one of their cards. Ask students to hold out cards flat like a table surface to each other and line them up so that they are even. Explain that their cards are now planes which are "co-planer" Now one student raise his/her card. Cards are no longer co-planer, but they are still parallel. Now take a third card and stand it up on one of the cards. This card is perpendicular to the other cards. It is at a right angle to the other two cards. (volunteers sit down)
4. Each student prepares his/her decks of slot cards: "Now we are going to cut notches in all our slot cards so that we can connect and build with them so that we can create structures with co-planer and perpendicular planes that connect. Find the one card in your stack with the slots in it. Take one other card and line it up behind the slotted card. Following the pre-cut lines on the top card, cut slits into the bottom card. Do this for all five cards that do not have slits."
5. "This slot card prep will take a while, so while you prepare them, let us discuss built structures. What are some built structures in our town?" Address the Essential Questions above. (Have a student scribe write on the board or large paper all the ideas students come up with). Which of these are public spaces? Which are more private spaces? Which are unique to your town? Which are generic and found in other places? (photograph this brainstorming sheet so that we can share it on the site with other students.)
6. Now shared the brainstorming sheets from Baku, Azerbaijan and San Jose, California. Compare and contrast. What did students identify in Baku that we do not have here and vice a versa. Link to

these brainstorming images are on this page: <http://www.slotshelters.com/explore/building-prototypes-of-slot-shelters/student-work>

7. Hand out the [Slot Card Connectors pdf file](#) (one per student) and asked students to cut out five connectors to start with. Cut slit at the slot markings. "We are using these connectors so that we can connect the slot card planes in more varied ways. The circle connector has slits so that you can join cards in acute and obtuse angles. The straight connector enables you to connect cards so that they are co-planer." As students cut and prepare connector cards, look at the art images in the "Art and History Connection on this page: <http://www.slotshelters.com/explore/building-models-of-bus-shelters> (Ray and Charles Eames, the tortilla slot cards and the last image of balanced cards...we all know how difficult this last image is to create after trying it ourselves!) Many architects and artist have explored with slotted cards as it is an elegant and simple way to take planer shapes and build solid geometry forms.

8. **Design Challenge.** We have talked about different built structures and today we are going to focus on one type of built structure: a bus shelter. These are existing nodes in our community that many urban planners are thinking about in new ways. How can a bus shelter be more than just a spot to sit and wait for the bus while you ignore the people around you? How can a bus stop be a community gathering place? Or designed to play an environmental or educational role? How can it be designed to be more inviting? Playful and useful to the community? Could it collect water? Have solar panels? Rooftop gardens? Provide local employment of some sort? We are going to look at some innovative bus shelters designs before we group into teams to create our own bus shelters: <http://trendland.net/creative-bus-stop-design/>

9. Form teams or 3-4. You will now group into architecture firm teams. Each team must get one Student Project Statement Form and write down each team member's name. Students will write on this card what local need your bus shelter is addressing. Students create their group shelter collaboratively with both the slotted white note cards and the connectors. Students may cut windows and doors into the cards, cut out additional connectors, draw on the cards, use a little bit of tape, fold and curve the cards and each team can use up to three scraps of cardboard. (there should be at least 45 minutes for them to work at this and 15 minutes for the statement writing).



Above: 7th grader, Kadin Whitsitt created this bus stop shelter. It has an informal library, candy machine, message board, large clock (that can be seen from across street) and a light for reading. People can get homework done at the bus stop and leave messages for each other. Translucent ceiling (plastic notebook binder cut up) lets light in.



Above left: A 5th grade student team from Stevens Creek Elementary designed a health clinic/bus stop to serve homeless people. Above right: bus stop shelter by public participant at 2012 ZERO1 Biennial Street Festival. This person wanted there to be more fun in waiting for the bus so added swings. There is an energy generating fan that creates power to illuminate the bus stop shelter at night. A large recycling can is at left.

CLOSURE: Students clean up desks so that only structure and statement cards are on the desks. Students do a walk around, presenting their designs to classmates in mini 2 minute explanations. Photograph models to post on the site so that other students can read statements and see structures. Also photograph at table level so that students can envision what models looks like at full scale.

ADAPTATION AND EXTENSION:

Students could create scaling grid and calculate exact scale of cards relative to a full scale bus shelter at 10' x 5' x 7' tall.

Students could create pattern designs on their cards representing other aspects of their cultures: vegetation, habits and their personal houses, neighborhoods. etc. Students could expand on the idea of bus shelters based on their environments and or neighborhood configuration. Students could create connector cards of different shapes for the card building. They can explore designing additional connector cards that will connect cards in other ways. Students could explore how cardboard is used in prototyping in real life careers. Sample video in the middle of main [Explore page](#).

ASSESSMENT:

Did student create thought provoking shelter structures? Did student use correct geometry and visual arts vocabulary in explaining their team structure in class discussions and in the statement form? Did students clearly explain community need they were addressing in their shelter? Did student create a neat and careful structure? Did student attempt to complete their structure design in timely manner? Did the structure stay at a reasonable size? (rubric is on the resource page of website)

NOTE TO THE TEACHER:

- Teachers should have cameras available to record the shelters building process and the final result of shelter models.
- The Conceptual Model Team Statement form should be printed in advance. 1 form per team.

ESSENTIAL VOCABULARY:

Pattern: the repetition of an element (or elements) in a work of art.

Structure: In [engineering](#) and [architecture](#), a structure is a [body](#) or assemblage of bodies in space to

form a system capable of supporting [loads](#).

Shelter: a basic [architectural structure](#) or [building](#) that provides cover.

Balance in visual arts: arranging elements so that no one part of a work overpowers, or seems heavier than any other part.

Balance in Architecture/Built-Structure: Balance is visual concept that relates to our experience of physical balance.

GRADE FOUR & FIVE STANDARDS ADDRESSED

Lesson plan created by Corinne O. Takara with early draft revision assistance by Pantea Karimi
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