



Olin College of Engineering

Teacher's Guide for Design Sketching for Non-Artists

Designed by Evelyn Kessler (Olin '24) and Alex Luna (Olin '22)



Workshop Description

To be an entrepreneur, designer, or engineer, you need to get your ideas out onto the page! In this workshop you will learn sketching skills such as how to use multiple line weights, what is isometric view, how to draw motion, and more that will be useful at any level!

Workshop Requirements

- » Time: 1 hour and 30 minutes
- » Materials: paper (at least one sheet per person), writing utensil (at least one per person, pen or fine tipped marker preferred), small straight edge for lines (for those who want it, very optional)
- » Suggested ages/grades: ages 11 to 17, grades 6 to 11
- » Prerequisites: None, though suitable fine motor control and openness to asking questions when stuck helps to ensure the best experience.

Learning Goals

What skills/knowledge will be developed?

- » Practice and proficiency in basic drawing skills, like lines and curves, culminating in drawing a 3D box and mug.
- » Proficiency in using multiple line weights.
- » Skills in quick sketching, visual communication, iteration
 - Quick sketching: How to control your hand and arm to draw lines, curves, and circles
 - Visual communication: How to prioritize elements of a design, how to use different views to represent the same system, why sketching is an important part of the design process
 - Iteration: How to learn from a sketch, how to make changes to a sketch for better communication, how to explore options using sketching
- » Ideally, students develop the confidence to explore and make mistakes, seeing sketching not only as an aesthetic practice but as a means of thinking and communicating.

Advanced Vocabulary

Isometric : a type of 3D drawing in which parallel sides are the same dimension

Iteration : repeating a process adding a small change each time, in order to explore the idea

Fidelity : how exact/detailed an item is, especially a copy

Fantastical: like something out of a story, unrealistic, a fantasy

Please Use These Materials and Tailor Them to Your Students!

We encourage you to use these materials, editing and modifying them as appropriate for your students! When you use, share, incorporate, or modify these materials, please keep the license notice (from the footer) and credit “Olin College’s course on Mathematics/Engineering Outreach for Adolescent Learners.” We also humbly request that you email sarah.adams@olin.edu if you use these materials, as we are tracking their impact and how far they travel!

Suggested Notes and Tips for Running the Workshops

1

What is this workshop?
¿Qué es este taller?

- Sketching for non-artists
- What are design sketch tools?
- How can we describe our materials better?
- For those interested in: drawing, sketching, doodling, product design, engineering, graphic design.
- ¡Recopilado para personas que se identifican como artistas
- ¿Qué son los materiales de diseño?
- ¿Cómo podemos comunicar ideas visualmente?
- Herramientas de interés en: Dibujo, bocetos, doodling, parámetros, diseño de productos, encuadernación, "talking" /taco
- Con una hora o más.

We gave an overview of the workshop as an introduction because this was an optional workshop, and we wanted to communicate its goals so that students could make an informed decision about taking the workshop. If you're in-person, you may be able to skip this.

2

Design Sketching for Non-Artists
Diseño de dibujo para los que no identifican como artistas
Evelyn Kessler (she/her) and Alex Luna (he/him)

Title slide! Introduce yourself and your pronouns. (Please edit this slide to use your name and pronouns)

3

Materials
Materiales

- Paper (or something else to draw on)
- Pencil, pen, or marker
- Optional: Pen or marker with a different thickness
- Optional: Household objects for reference
- Papel (o una superficie para dibujar)
- Lápiz, bolígrafo, o marcador
- Opcional: Bolígrafo o marcadores con diferentes grosores
- Opcional: Objetos en su casa para referirse en dibujos

Give students a moment to prepare the materials they may need. You may also skip this if you are providing materials.

4

Schedule
Programa

- Intro (5min)
- Presentation (15min)
- Part I: What are Design Sketches? (10min)
- Materials (10min)
- Part II: Adolescent Technology (10min)
- Aha to Sketching (10min)
- Sketch practice (10min)
- Drawing (10min)
- Feedback (10min)
- Menos a la hora (10min)
- Presentación (15min)
- Parte I: ¿Qué son los bocetos de diseño? (10min)
- Materiales (10min)
- Parte II: Tecnología adolescente (10min)
- Aha a dibujar (10min)
- Práctica de bocetos (10min)
- Dibujo (10min)
- Comentarios (10min)

We offer students the schedule to prepare them for potentially tight time-boxing and to give a taste of what they'll learn.

5

Let's play a game!
Juégate a jugar un juego!

You'll be switching gears to do a warm-up game, so get ready to be involved with students. The goal of the Pictionary game is to show that students may already have an idea of how to quickly illustrate a concept, focusing on the most important details that communicate "what it is" and "what it does".

- On Zoom, have students put their names in the chat if they're interested in drawing. You can direct message the volunteer with the prompt and have them get started. Then, have other students guess in the chat.
- Suggested prompts that use basic shapes: Bike, Hairbrush, Traffic cone, Soccer ball, Kicking.

6

How to Annotate on Zoom on a Computer
Cómo anotar en Zoom si usas una computadora



Slides 6, 7, and 8 feature instructions for how to access annotations on Zoom on desktop and mobile. Depending on your context, you might want to skip these slides.

7

How to Annotate on Zoom on a Computer
Cómo anotar en Zoom si usas una computadora



8

How to Annotate on Zoom on a Tablet or Phone
Cómo anotar en Zoom si usas una tableta o un teléfono



9

Let's play a game!
Juégate a jugar un juego!

After drawing, you should reinforce certain ideas or make observations, like asking, "What made you realize it was a bike?", "Why did you decide to draw the handle of the hairbrush first?", or "What led you to think it was a volcano before a traffic cone?"

- Prepare for some hesitation, especially on Zoom. Sometimes no student volunteers to participate. If this is the case, you can either move forward without the game, or you can offer to draw and have students guess. We prefer the latter because it helps break the ice and demonstrates your preparedness.

Suggested Notes and Tips for Running the Workshops

10

Part I: Design Sketches: What, why, how?
Parte I: Bocetos de Diseño: Qué, porqué, cómo?

Time to shift gears again. Now that students have gotten a taste of what we consider to be design sketching at its most basic--communicating an idea quickly--we can talk in more detail. You should explicitly tie the game to the concept of design sketching.

- Many of these photos are from us, the creators. We have an easy time telling the story of how we made them because they're our projects! You may want to take a moment to figure out how you want to approach telling these stories. We will share details so you can accurately talk about the images, but if you have your own examples to volunteer, we highly recommend tying the presentation to your own work.

11

What are design sketches?
¿Qué son bocetos de diseño?

- Key elements of a hypothetical design
- Simple, fast
- Made for iteration
- Elementos clave de un diseño conceptual
- Simple, rápido
- Hecho para iteración



Our bullet points talk about what design sketches are. Of note for you, the speaker, are the images.

- The car image demonstrates iteration and key elements. A car has 4 wheels (two that we can see), but there are a lot of different profiles it can have.
- The whiteboard image came from a conversation about making a box that opens by the push of a button. The two friends explored different ways that the door might function but decided that a gear attached to a curved pinion would be able to draw the door down and drop it. The whiteboard shows various views, including a 3D representation of the door opening, a 2D side view, a simple representation of the gear and pinion, and some musing about where the pinion might be located relative to the box. This whiteboard demonstrates how quickly design sketches happen, focus on key ideas, and two elements we'll discuss in later slides: design sketches as communication (why), and the use of multiple views to flesh out an idea (how).
- The pencil drawing is the preliminary design for a backpack that would hold an oxygen tank. Notably, it is cylindrical since it holds a tank. Care was taken to focus on how the flip-up top works. However, other details are obscured--it's not important to look at the backpack straps, which are conventional and already known for this design. The artist focused on the elements that made this design unique.

12

Why design sketches?
¿Por qué bocetos de diseño?

- Communicate ideas of your head and onto the page
- They are sometimes used to challenge ideas
- They allow you to iterate
- They are often used to explore ideas
- They are often used to explore ideas



Design sketches are all about communication. Not just with other people--though this is important! -- but also with yourself. Design sketching helps to make the fuzzy areas of an idea in your head into something more explicit. Sketching is another way of thinking.

- The sticky notes feature two ideas from an ideation session about making “Something wearable that makes noise using sensors”. The goal with these sketches was to communicate with the rest of the team about an idea. We like to focus on how these sketches take the verbal ideas and make them more explicit, eliminating ambiguities. A “shoe with pressure sensors” could manifest in many different ways: Is it a high-heel that squeaks when you step into it? Where is the sensor? The simple drawing with two dark boxes representing sensors gives us a much clearer idea of what this is and how it might work--similar to a tap dancing shoe, with separate toe and heel. The glove image is a little more self-explanatory, but it cements the idea of how we might construct a glove that has bend sensors--putting sensors on the outside of the hand. These images are also good examples of the fact that design sketches do not need to be pretty!
- The kangaroo sketches come from a project where the student needed to design a mechanism that would hop and was inspired by an animal. The designer also knew she would be using flat, laser-cut materials.
 - The bottom left corner features the very first sketch of this idea: Just a few lines that follow the profile of this mechanism. A suction cup attached to the top part would be pushed down, and then a tension mechanism would pop it back up.
 - The top left part of the sketch page is the second drawing, with rubber tubes (blue) providing tension.
 - The red and blue line pattern to the right came about as the designer realized that she didn't know how she would orient the rubber bands relative to the legs. This very simple representation provides more insight into the mechanism.
 - The other pull-out below, labeled “tube connector”, provides greater insight into how the rubber tubes could be slotted into the system.
 - Though there are still areas of ambiguity, the most important and complicated mechanisms have already been planned in this sketch and can be tested physically.

Suggested Notes and Tips for Running the Workshops

13



The image here is of various drafts for a modular tree-shaped centerpiece for libraries to display information. Once again, we are prioritizing communication and quick sketching. The important elements of this design are the pieces that form the tree, how the tree looks, and how big the tree is/how a person would interact with it.

- The first idea features hollow pieces that slot into each other, similar to slot-and-build toys. The drawing is composed of basic shapes like lines, circles, and ellipses. The detailed view to the left shows the objects in 3D, while the to-scale view is more simplified and draws everything as little boxes. Because we have a more detailed view, we can now simplify.
- At least one part of a design sketch should visually represent the most important mechanisms. In this second idea, the pieces of the centerpiece were cushioned blocks that could snap together using flexible fabric snaps. The detailed drawings show the block shapes and the proposed orientation and location of the snaps. The design sketch only needs to show the “unknowns”; the designer isn’t reinventing the wheel, or the snap in this case, so it isn’t drawn in detail. Once we have an idea of how the pieces fit together, they can be drawn in the zoomed-out view without all the detail. Here’s a self-critique: I could have drawn at least one of the blocks snapped to another one in order to show how they fit together, especially if they are differently shaped. If we had moved forth with this idea, that definitely would have been one of my later sketches.
- As illustrated in this whole image, different views of the same system are important for illustrating what the design does. It’s also a good idea to try and describe the “character” of your design; In this situation, the tree would be composed of flexible tubes like pool noodles. Instead of drawing a straight-on cylinder, I drew a wobbly one, which better “tells the story” of how the tree to the right is formed.

14



Let students know that they are about to practice drawing. This page shows how to more confidently and competently draw basic forms.

- The gifs to the side illustrate how to draw with one’s elbow and wrist. However, I also recommend miming the motion yourself. I like to show myself moving just my wrist when I draw, showing how little my range of motion is, and say, “If I draw just with my wrist, I might hurt myself, and I’m more likely to make wobbly lines”. As I increase my range of motion, I have 3 points of articulation with which I can move my hand. I like to do a little dance where I wiggle my whole arm to show how much more freeing and fluid whole-arm art can be.
- The previous sketches hopefully have primed your students to see that design sketches are built of very simple shapes, but reiterate that straight lines and little curves get the job done. Encourage them to know that a circle or square does not need to be perfect, it just needs to be passable.
- Teach students that an ellipse is essentially a “squished” oval with an equivalent curve on either side. I like to tell students that they may prefer drawing an ellipse as two mirrored curved lines rather than in one motion (which is how they likely will draw a circle).
- The underlying theme of this presentation is that ANYONE CAN SKETCH! Confidence and decisiveness tend to produce better sketches. Quick, decisive strokes help you bang out an idea.
- In the realm of confidence, I also suggest--though do not mandate!--that students try to sketch with a pen or permanent marker rather than pencil. I find that it helps me to focus on getting my ideas out of my head--which we talked about earlier--and to work with my mistakes. I show in the second mug and box demo an example of a time when I made a mistake and could not fix it, and how you can work around mistakes with permanent ink. I also like to add that sometimes the mistakes we make when drawing tell us something subconscious about our design process. If we find ourselves drawing a curve where we think there should be a straight line, that may be saying that there is an underlying logical disconnect. Sketching is thinking, and thinking can be messy, but letting ourselves SEE our mess helps us untangle any misgivings we may have.

15

A little warm-up...
Use a reticulated sponge.

This is a breather slide to let students know you’re switching over to an activity that they can participate in. This activity allows every student the opportunity to create a simple 3D drawing that they (hopefully!) can be proud of.

Suggested Notes and Tips for Running the Workshops

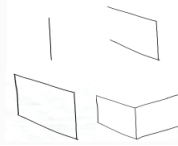
16

Sketching a coffee mug sitting on a box
Dibujando una taza de café sentada en una caja



- Tell students that this is what they will be drawing: A coffee mug sitting on top of a box.
- If you are on Zoom, you should use the left side of the slides to draw your mug alongside students. Please demonstrate alongside them! We had two presenters: One who drew the original mug and box, describing each step, and the other presenter following along. This can be good because it puts the presenters in the role of student as well. If you're only one presenter, just say what you're doing as you're doing it.

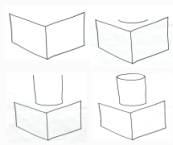
17



Tell students to draw the box on the BOTTOM HALF of their page, leaving space for the mug.

- Start with the vertical line closest to us for the box. When drawing something in perspective, it's easiest to start with the most consistent things; verticals are very consistent.
- Then, draw two angled lines to the left, ending on the same vertical, and following the same angle.
- Connect them with a vertical line. You have the first side of the box!
- Then, draw two angled lines to the right, again with the same angle and similar vertical endpoint.

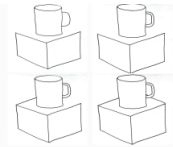
18



- Add the vertical line to the right, now you have the two sides of the box.
- We pause to draw the bottom of the mug before closing the box because it is in front of the back lines. Tell students to draw the bottom BELOW the two corners of the "book"-shaped sides of the box. You can draw a dotted horizontal (or diagonal) guideline between the two corners to show where the mug should be below; Otherwise it will look like it is floating! (This is a nice opportunity to mention guidelines and to encourage students to use them at the pace they need. For me, the artist of this tutorial, I've drawn a lot so I feel confident without them.)

- Then, we draw the sides of the mug, two vertical lines.
- Then we top off the mug with an ellipse; The bottom curve of the ellipse should be similar to the bottom of the mug, then we mirror it. The image is starting to come together!

19



- Students will draw the handle of the mug next, starting with the outer line. Encourage them to draw whatever handle they want, to give it a little flair. We've drawn triangular, heart-shaped, and square handles before.
- The shape of the outer handle should be mimicked inside to make it 3D.
- Now we close the box. From the left corner, we draw a line that follows the same angle as the RIGHT-SIDE angles.
- We do the same for the right corner, following the LEFT-SIDE angle. If the line of the box lines up with the inside hole of the handle, they should follow the line through there.

20



- The last step is to add another small ellipse inside the top of the mug to show that the rim has thickness and there's a hole. Then they're done!
- Tell students to keep their sketches, as they'll be adding to them later.
- Give students a moment to talk about the drawing or ask questions.

21

Time to sketch!
¡A dibujar!

Now that students have practiced drawing, they can draw their own ideas.

22

Some prompts to draw:

Algunas ideas para dibujar:

- What do you use to get ready in the morning?
- No one uses cars in the future. What do they use instead?
- What is something that could help you make a sandwich?
- ¿Cuál es una cosa que usas para prepararte en la mañana?
- Nadie usa coches en la futura. ¿Qué se usan en lugar?
- ¿Qué es algo que podría ayudarte a hacer un sándwich?

We have 3 prompts to guide student sketches, though if students have another idea--like something they've always wanted to make!--encourage them to sketch that too.

- The first prompt (what one uses to get ready in the morning) is good for students who want to practice techniques and visual communication without asking them to come up with an idea.
- The car-replacement prompt gives students the opportunity to think fantastically and be playful.
- The sandwich helper is a grounded prompt for students to think about practical, small-scale designs.

We give students about 10 minutes to draw, and draw alongside them, We like to talk through our thought processes as we go, but if you're in person or have more familiar students, you can have them speak with each other.

Suggested Notes and Tips for Running the Workshops

23

Take a Picture of Your Sketch!
(Toma una foto de tu dibujo)

We have asked students to take photos of their sketches to share later, but you can skip this slide if you're in person or don't require documentation.

24

Part II: Sketching Techniques: Gallery Sketches
Parte II: Técnicas de Dibujo: Dibujo de la Galería

Now that students have practiced basic sketching, we want to teach them more about advanced techniques.

- If a design sketch successfully communicates an idea, it may go through several more iterations. When the designer wants to share with other people, like stakeholders (the people they're working with, who care about the design) they may want to involve more advanced techniques in their sketches. These sketches are called Gallery Sketches.

25

Gallery Sketches: Designs for refining and sharing
Dibujos de la galería: Diseños para refinar y compartir



Gallery sketches are good for presenting with others. They don't need to be perfect or beautiful, but they should communicate an idea with more fullness. Your gallery sketch says that your idea is possible and you're thinking about how to make it real.

- These drawings are meant to communicate with people who may have less technical background from you. They tend to be cleaner and more refined.
- The bottom left photo features the final version of the object sketched to the right. The goal was to make a gift box containing 16 smaller boxes, with a reflective surface that would create the illusion of more boxes. The center sketch indicates this effect. The sketch to the far right shows the outside appearance, including some color and shading to indicate the shiny material and dimensions to help me design and build it. At the time, I wanted to use magnets to construct it, so I had some pull-outs of where the magnets would be (though later I changed it--gallery sketches aren't necessarily finals!). I also indicated other parts I would need, like a piece of acrylic with holes to arrange the boxes neatly.
- These gallery sketches fleshed out more of the details of this design with the goal of making it real and demonstrating its viability to my peers.

26

Técnicas

- Múltiple línea variable
- Isometría
- Perspectiva isométrica
- Color
- Dimensiones asíncronas
- Muestra

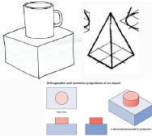


So, now we'll talk about some specific techniques you can employ to bring your sketches to the next level. The first, which we'll practice, is multiple line weights--using thicker and thinner lines to indicate different parts of a sketch. Especially as a sketch has more details and parts, line weight becomes very important.

27

Técnicas

- Múltiple línea variable
- Isometría
- Perspectiva isométrica
- Color
- Dimensiones asíncronas
- Muestra



Isometric perspective refers to a way of drawing things in 3D. It often comes to us naturally when trying to draw something in space.

- In real life, our eyes see things in a perspective where things that are farther away get smaller and things that are close seem bigger.
- "Iso-" means same and "metric" means measurement, so isometric perspective is a kind of perspective where the measurement of things stays the same regardless of distance. When we drew our mug and box, we used the same angle for both diagonal lines on each side. This is isometric perspective.

28

Técnicas

- Múltiple línea variable
- Isometría
- Perspectiva isométrica
- Color
- Dimensiones asíncronas
- Muestra



When we're drawing something that uses the same thing many times, we don't want to draw each individual element. Design sketches are about communicating ideas, and drawing MORE of something doesn't give the viewer any more information. When designing a hairbrush, we might draw one bristle in detail, but then draw the mass of bristles in a simpler way.

- The bottom example shows the overall shape of the bristles--a kind of cylinder--with some lines and dots to indicate texture and outliers.
- This same "detailed mass" effect is shown in detail on this map-drawing image. The shape is defined, then made more three-dimensional. Just focusing on outlying trees--taller or further from the mass--allows for a lot of depth to be implied without spending a lot of time.
- You might also use a different style, where you group things into smaller clumps, like the top left hairbrush which uses clusters of little bristles.

Suggested Notes and Tips for Running the Workshops

29

Técnicas:
 • Multiple line weights
 • Isometric drawings
 • Tracing
 • Dimensioning and scale
 • Color
 • Lines of greatest dimension
 • Perspective drawings
 • Dimensioning repetitive
 • Callouts
 • Dimensioning in circles
 • Hatching



Tracing can feel like a dirty word in the art world, but there are times it's okay to trace! Tracing over photos that you took can make your sketch much more detailed and professional looking. The important thing is to know what you are and aren't allowed to trace.

- In this situation, one of my team members took a photo of himself reaching out, and then traced it to create a detailed and realistic image of a person using this big information board.
- It's important to know what is and isn't okay to trace!
- Assume something isn't okay to trace unless stated otherwise, but know there's many things online which are alright to use.

OKAY:

- Photos you took yourself (these are the best!)
- Photos that are Public Domain, "royalty free", or have a "free content" license.
- Photos with Creative Commons licenses (Take a look at the rules of a photo or drawing's license; You may need to credit the person, or may not be allowed to use it if you're making money off your sketch.)

NOT OKAY:

- Copyrighted photos
- Someone else's artwork

30

Técnicas:
 • Multiple line weights
 • Isometric drawings
 • Tracing
 • Dimensioning and scale
 • Color
 • Lines of greatest dimension
 • Perspective drawings
 • Dimensioning repetitive
 • Callouts
 • Dimensioning in circles
 • Hatching

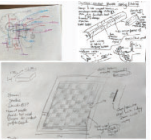


Color can help differentiate parts of your sketch, like notes you take from the core drawing, but it can also help paint a better picture of what you're making.

- In this example, the bottom image is shaped mostly like some palm tree leaves. The green color makes it more clear, but hopefully they look pretty much like leaves. What about the top sketch? Without color, it looks a bit like... pom-poms? A monster?
- Color and context helps to show that this is an abstract representation of a willow tree, with droopy green leaves and a brown trunk.

31

Técnicas:
 • Multiple line weights
 • Isometric drawings
 • Tracing
 • Dimensioning and scale
 • Color
 • Lines of greatest dimension
 • Perspective drawings
 • Dimensioning repetitive
 • Callouts
 • Dimensioning in circles
 • Hatching

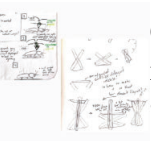


When working on a design sketch for something you want to actually manufacture, you want to start thinking about the size of what you're working with. One way you can do this is by writing down exact measurements, especially of small components that may make up the whole piece, like one square of a chess board.

- Another way you can approach this is by drawing people or other objects of known size relating to the object. Especially for things that people will be using, it's important to consider what size it is relative to the person.

32

Técnicas:
 • Multiple line weights
 • Isometric drawings
 • Tracing
 • Dimensioning and scale
 • Color
 • Lines of greatest dimension
 • Perspective drawings
 • Dimensioning repetitive
 • Callouts
 • Dimensioning in circles
 • Hatching

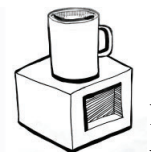


Often times, we're designing something that moves. Drawing the design in different stages, including potentially numbering each phase, is helpful for demonstrating its motion.

- "Speed lines" can indicate the direction something is moving in. The first image is an observation of the click beetle, which is a beetle that jumps. Lines on the bottom of the beetle in panel 2 show that the beetle is moving upwards. Lines above the beetle on panel 4 show it is now falling.
- Motion can be simplified into a path. Panel 3 of the first image indicates that the click beetle jumps and also spins in the air, without needing to draw the beetle itself.
- Arrows in the direction of motion and force can be really important for indicating motion. The right-side image is a mechanism that hops using tension. Note arrows that show the directions parts of it can move, like the bottom right corner which shows how dowels can slide along a track up or down.

33

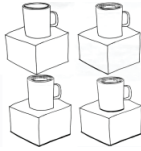
*Let's Update Our Mug!
 ¡Vamos a actualizar nuestra taza!*



Now that we've learned some new techniques, we'll apply these to drawing a mug and box with more detail.

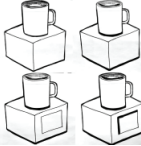
Suggested Notes and Tips for Running the Workshops

34



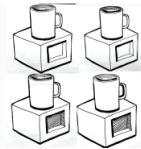
- We want to add thickness to lines we can “reach around”, so we’ll start by thickening the edge of the mug’s rim that’s facing the viewer.
- We can then add shading. I left a smaller ellipse on the inside of the mug blank to suggest the light hitting it, but you can shade straight through.
- You may notice that there’s a slight shadow over that area. I drew this example in Sharpie. When I make a mistake that I want to cover up, I cut another sheet of paper and glue it over the area where the mistake is. Then I can fix it as I need! I learned this from looking at storyboards from the cartoon Adventure Time, so a lot of professionals use this too. I like to encourage people to sketch with pen because it’s faster and more assertive, but I also wanted to mention that there are ways to save yourself if you made a mistake!
- Now, we’ll add thicker lines to the bottom of the box and the bottom of the mug. This helps us separate the two objects from each other. It’s possible that there’s a box that has a mug fused to the top, like it was glued. When we use line weight, we make it extra clear that there’s two different objects here.

35



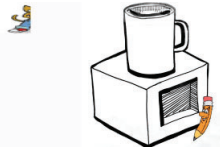
- Following the logic of separating objects out, we want to add thicker lines to the entire outside of the two objects. Draw a thick line on the outside of the box. Then, draw one on the outside of the mug, including the parts of the mug intersecting with parts of the box. This technique becomes really useful when we have a lot of components, like many gears, so it’s good to practice with a small example.
- Now we want to reassert the bottom and wrap-around areas by making them thicker. We have three line thicknesses: thinnest for the inside and details, like the corners of the box, thicker for the outside of the entire object, and thickest for points of contact with something else, or an area of interest.
- At this point we could stop! However, I wanted to take a moment to add more detail. Let’s draw another rectangle on the inside of the right side of the box. Same method as before: vertical line, two angled lines

36



- Now, again, we could have stopped there and it would’ve been clear that there was some kind of shelf. But let’s go a bit further and define its depth.
- I drew a shallow shelf by putting a vertical line and an angled line close to the bottom right corner. If I draw a vertical line and an angled line closer to the top left corner, it will look deeper. Feel free to play with the depth!
 - I then connect the two corners.
 - I add some shading by drawing lines that are mostly the same angle as the side (or plane) they’re on. I’ve decided the light is coming from me, so it’s above and in front of this box. Thus, the bottom part of the shelf is left light while the side and back are dark. Shading can be strategic to point out specific things, like coloring--if one thing is in front of something else, but it’s important to see all the details, you might draw the front object as “see-through” and use shading to indicate which object is behind. In this case, shading was just adding detail and showing the parts that are “deeper” than the surface of our objects.

37



And that’s it! Congratulations!

38

*Round II: Time to sketch!
¡A dibujar!*

For round two of sketching, we encouraged students to practice the more advanced gallery sketching skills.

39

*Some prompts to draw:
Algunas ideas para dibujar*

- What do you use to get ready in the morning?
- No one uses cars in the future. What do they use instead?
- What is something that could help you make a sandwich?

*• ¿Cuál es una cosa que usas para prepararte en la mañana?
• Nadie usa coches en la futura. ¿Qué se usa en lugar?
• ¿Qué es algo que podría ayudarte a hacer un sándwich?*

See notes on Slide 22 about sketching prompts. We generally gave another 10 minutes of sketching time here, but this is a good place to be flexible, adding more time if students seem engaged or less if there is little time remaining.

40

*Let’s talk!
¡Hablemos!*

This slide signals the end of the formal instruction and sketching. We ended each session with some time for everyone to talk about their experience, placing emphasis on new skills that students learned, something they are interested in pursuing more, and any feedback they have for us about the workshop as a whole.

41

*Shareouts:
Compartir:*

- What is one technique you used the second time you didn’t use the first?
- ¿Qué es una técnica que usaste en el segundo paso que no usaste la primera vez?

To facilitate student discussion, we have a slide with a discussion prompt. Our goal with the sharout time is to have students communicating with each other about sketching, not judging or comparing their sketches. We encourage you to add more prompts to this slide if written discussion prompts are helpful for your students.

Suggested Notes and Tips for Running the Workshops

42

*Final thoughts!
¡Pensamientos finales!*

A third discussion slide. Here we asked students if they had any final questions, comments, or feedback about their sketches, sketching in general, or our workshop.

43

*Thank you and goodbye!
¡Gracias y adiós!*

This is the last slide in the deck, signaling the end of the workshop.